

RED CEDAR

GATHERING COMPANY

NATURAL GAS GATHERING AND TREATING

November 5, 2019

Part 70 Program
Environmental Programs Division
Air Quality Program
P.O. Box 737 MS #84
Ignacio, CO 81137

Via email: airquality@southernmde-nsn.gov

**RE: Part 70 Operating Permit Renewal Application
Red Cedar Gathering Company, South Ignacio Central Delivery Point**

On April 25, 2019, Red Cedar submitted to EPA a request to revise permit #SMNSR-SU-000013-2016.003 for the South Ignacio Central Delivery Point. The EPA has not provided Red Cedar with a specific date by which they expect to finalize the revised synthetic minor new source review permit for the facility. However, they have verbally informed us that they expect to do so prior to January 23, 2020, which is the date the facility's part 70 operating permit renewal application is due. After conversations with EPA regarding the timing of issuance of the revised SMSNR permit and that it's delay may require us to submit two complete part 70 renewal applications, one prior to SMSNR finalization and then another after, EPA recommended we prepare the renewal application with our requested revisions in place.

Therefore, this part 70 operating permit renewal application incorporates the revisions we requested to the facility's SMSNR permit and includes the following materials:

Materials

- Forms CTAC, GIS, EUD-1, EMISS, PTE, and IE;
- Regulatory Applicability Analysis; and
- Supporting documentation.

Should you have any questions or need additional information, please do not hesitate to contact me at (970) 764-6921.

Sincerely,
RED CEDAR GATHERING COMPANY



Kyle Hunderman
Environmental Compliance Specialist II – Air Quality

Cc: US EPA, Region 8, via email: r8airreportenforcement@epa.gov

SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70FORM CTAC - CERTIFICATION OF TRUTH, ACCURACY, AND
COMPLETENESS BY RESPONSIBLE OFFICIAL

INSTRUCTIONS: One copy of this form must be completed, signed and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by part 70 permit).

Company Name: **Red Cedar Gathering Company**Facility Name: **South Ignacio Central Delivery Point****A. Responsible Official**Facility ID: **08-067-U0033**Name: (Last) Hadrick (First) Kourtney (MI) _____Title: President – Chief Operating OfficerMailing Address: 125 Mercado Street, Suite 201City: Durango State: CO Zip Code: 81301 - _____Telephone: (970) 764-6900 Ext. _____ Email: khadrick1@redcedargathering.com**B. Certification of Truth, Accuracy and Completeness**Instructions: **This form must be signed by the responsible official**

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed): Kourtney HadrickName (typed): Kourtney HadrickDate: 11-5-19



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



APPLICATION FORM GIS – GENERAL INFORMATION AND SUMMARY

A. Mailing Address and Contact Information

Facility Name: South Ignacio Central Delivery Point Facility ID: 08-067-U0033
 Mailing Address: 125 Mercado Street; Suite 201
 City: Durango State: CO Zip Code: 81301 - _____
 Contact Person: Kyle Hunderman Title: Environmental Compliance Specialist II- Air Quality
 Telephone: (970) 764-6921 Ext. _____ Email: khunderman@redcedargathering.com

B. Facility Location

Temporary Source: ☐ Yes ☒ No
 Plant Site Location: _____
 City: Durango County: La Plata
 Legal Description: Section: 32 Township: 33N Range: 7W Coordinates Lat.: 37.053917 Long.: -107.625222
 Land Status of Facility Location: ☐ Tribal Trust Land ☒ Fee Land ☐ Allotment ☐ Other: _____
 Is the facility within 50 miles of:
 Federal Class 1 areas? ☒ Yes ☐ No If yes, which area(s): ☐ Mesa Verde NP ☐ Weminuche Wilderness Area
 Affected States? ☒ Colorado ☒ New Mexico ☐ Utah ☐ Ute Mtn. Ute ☐ Navajo ☐ Icarilla

C. Owner

Name: Red Cedar Gathering Company Telephone: 970-764-6900 Ext. _____
 Mailing Address: 125 Mercado Street; Suit 201
 City: Durango State: CO Zip Code: 8131

D. Operator

☒ Same as Owner

Name: _____ Telephone: _____ Ext. _____
 Mailing Address: _____
 City: _____ State: _____ Zip Code: _____

E. Application Type

Instructions: Mark only one permit application type and enter the appropriate date if requested.

- ☐ Initial Permit, date operations commenced: _____
 ☒ Permit Renewal, existing permit expires: 07/23/2020
- ☐ Significant Mod
 ☐ Minor Permit Mod (MPM)
 ☐ Group Processing, MPM
 ☐ Administrative Amendment

F. Applicable Requirement Summary

Instructions: Mark all that apply.

- ☐ FIP/TIP
 ☒ PSD
 ☒ NESHAP
 ☐ Sec. 112(d) MACT
 ☐ Sec. 112(g) MACT
 ☐ Sec. 112(j) MACT
- ☒ Federal Minor NSR
 ☐ CAA Section 111
 ☐ RMP [Sec. 112(r)]
 ☐ Stratospheric ozone
 ☐ Early reduction of HAP
- ☐ Non-attainment NSR
 ☐ Phase I acid rain
 ☐ Phase II acid rain
 ☐ Tank Vessel requirements, sec. 183(f)
- ☐ Section 129 Standards/Requirements
 ☐ Consumer/Commercial products section 183(e)
- ☐ NAAQS, increments or visibility (temporary sources)

Has a risk management plan been registered? ☐ Yes ☒ No If so, with which regulatory agency: _____Has a phase II acid rain application been submitted? ☐ Yes ☒ No If so, with which permitting authority: _____**G. Source-Wide PTE Restrictions and Applicable Requirements**

Instructions: Cite and describe any emissions-limiting requirements that apply to the facility as a whole, or that apply broadly or in an identical fashion to all the sources at the facility. Include any requirements from new source review permits or any consent decrees, if applicable.

Unit E1 NOx emissions shall not exceed 9.2 lb/hr and 40.3 tons per year

Unit E1 CO emissions shall not exceed 12.9 lb/hr and 56.5 tons per year

H. Process Description

Instructions: List all processes, products, and SIC codes for normal operation, in order of priority. Also list any processes, products, and SIC codes associated with any alternative operating scenarios, if different from those listed for normal operation. Provide a narrative description of all facility operations as an attachment.

Process	Products	SIC
compress and dehydrate natural gas	medium pressure natural gas	4922

Instructions: Assign an emissions unit ID and describe each significant emissions unit at the facility. Control equipment and/or alternative operating scenarios associated with emissions units should be included in the description.



J. Facility Emissions Summary

Instructions: Enter the uncontrolled and controlled potential to emit (PTE) for the facility for each air pollutant listed below.

Uncontrolled PTE

NO_x: ^{212.5}____ tons/yr VOC: ^{101.2}____ tons/yr SO₂: ⁰____ tons/yr PM₁₀: ^{4.4}____ tons/yr CO: ^{261.9}____ tons/yr
 Lead: ⁰____ tons/yr GHGs (mass-based): ____ tons/yr GHGs (CO₂-equivalent): ^{54325.1}____ tons/yr
 Total HAP: ^{25.3}____ tons/yr Single HAP emitted in greatest amount: Formaldehyde PTE: ^{17.8}____ tons/yr

Controlled PTE (federally enforceable)

NO_x: ____ tons/yr VOC: ____ tons/yr SO₂: ____ tons/yr PM₁₀: ____ tons/yr CO: ____ tons/yr
 Lead: ____ tons/yr GHGs (mass-based): ____ tons/yr GHGs (CO₂-equivalent): ____ tons/yr
 Total HAP: ____ tons/yr Single HAP emitted in greatest amount: ____ PTE: ____ tons/yr

K. Existing Federally Enforceable Air Permits
☐ N/A

Permit number: V-SUIT-0031-2015.02 Permit type: Part 70 Operating Permit Permitting Authority: AQP
 Permit number: SMNSR-SU-000043-2015.002 Permit type: Synthetic Minor New Source Review Permit Permitting Authority: EPA
 Permit number: _____ Permit type: _____ Permitting Authority: _____

L. Additional Information Required

- 1) Attach a site map for the facility
- 2) Attach a complete process flow diagram for the facility which labels all emission units with their assigned emission unit IDs.
- 3) Provide driving directions to the facility.
- 4) Provide a description of safety requirements for visitors.
- 5) Provide an updated construction and permitting history of the facility, including the PTE, controlled and uncontrolled, at each stage of construction.
- 6) Attach copies of any cross-referenced documents.
- 7) Provide supporting documentation for the PTE of all pollutants, including the source of emission factors, any available copies of manufacturer's specifications, copies of guarantees for control reduction efficiencies, and emission calculations.



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E1 Description: Waukesha L7044GSI 4SRB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: _____ Manufacture Date: 03/01/2003

Order Date from Manufacturer: 03/01/2003 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L7044GSI Serial No.: C-14529/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 13.2

Fuel Consumption (Btu/bhp-hr): 7881

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1680</u>	Horsepower: <u>1680</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|---|
| <input type="checkbox"/> Lean Burn | <input checked="" type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input checked="" type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>128.5 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>128.5 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☐ N/A

Device type: ☒ NSCR Catalyst ☐ Oxidation Catalyst ☐ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency: NOx (~80%), CO (~68%)
Example: CO (90%), VOC (45%)

Efficiency estimation method: Federally enforceable emission limit

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E2 Description: Waukesha L7042GL 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: _____ Manufacture Date: 10/21/1996

Order Date from Manufacturer: 10/21/1996 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L7042GL Serial No.: C-12215/4

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 9.7

Fuel Consumption (Btu/bhp-hr): 7284

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1480</u>	Horsepower: <u>1337</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity
(MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☒ N/A

Device type: ☐ NSCR Catalyst ☐ Oxidation Catalyst ☒ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency:
Example: CO (90%), VOC (45%) _____

Efficiency estimation method: _____

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E3 Description: Waukesha L7042GL 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: _____ Manufacture Date: 04/01/1991

Order Date from Manufacturer: 04/01/1991 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L7042GL Serial No.: 403301

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 9.7

Fuel Consumption (Btu/bhp-hr): 7284

Name Plate Rating

Site Rating

Horsepower: 1480

Horsepower: 1337

Speed (rpm): 1200

Speed (rpm): 1200

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☒ N/A

Device type: ☐ NSCR Catalyst ☐ Oxidation Catalyst ☒ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency:
Example: CO (90%), VOC (45%) _____

Efficiency estimation method: _____

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E4 Description: Waukesha L7042GL 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: _____ Manufacture Date: 07/01/1996

Order Date from Manufacturer: 07/01/1996 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L7042GL Serial No.: C-12097/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 9.7

Fuel Consumption (Btu/bhp-hr): 7284

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1480</u>	Horsepower: <u>1337</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity
(MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>94.4 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☒ N/A

Device type: ☐ NSCR Catalyst ☐ Oxidation Catalyst ☒ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency:
Example: CO (90%), VOC (45%) _____

Efficiency estimation method: _____

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



**SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70**



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E5 Description: Waukesha L5794LT 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: 08/24/2007 Manufacture Date: 02/01/2006

Order Date from Manufacturer: 02/01/2006 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L5794LT Serial No.: C-15962/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 10.6

Fuel Consumption (Btu/bhp-hr): 7600

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1447</u>	Horsepower: <u>1401</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☐ N/A

Device type: ☐ NSCR Catalyst ☒ Oxidation Catalyst ☐ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency: CO (93%)
Example: CO (90%), VOC (45%)

Efficiency estimation method: Emission test data

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



**SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70**



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E6 Description: Waukesha L5794LT 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: _____ Manufacture Date: 11/01/2005

Order Date from Manufacturer: 11/01/2005 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L5794LT Serial No.: C-16161/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 10.6

Fuel Consumption (Btu/bhp-hr): 7600

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1447</u>	Horsepower: <u>1401</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☐ N/A

Device type: ☐ NSCR Catalyst ☒ Oxidation Catalyst ☐ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency: CO (93%)
Example: CO (90%), VOC (45%)

Efficiency estimation method: Emission test data

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



**SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70**



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E7 Description: Waukesha L5794LT 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: 03/29/2006 Manufacture Date: 09/12/2005

Order Date from Manufacturer: 09/12/2005 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L5794LT Serial No.: C-15838/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 10.6

Fuel Consumption (Btu/bhp-hr): 7600

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1447</u>	Horsepower: <u>1401</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☐ N/A

Device type: ☐ NSCR Catalyst ☒ Oxidation Catalyst ☐ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency: CO (93%)
Example: CO (90%), VOC (45%)

Efficiency estimation method: Emission test data

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



**SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70**



**FORM EUD-1 - EMISSIONS UNIT DESCRIPTION FOR
INTERNAL COMBUSTION SOURCES
(Engines, Turbines, Generators)**

INSTRUCTIONS: Complete this form for each significant emissions unit best described as a fuel combusting unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

A. General Information

Emissions unit ID: E8 Description: Waukesha L5794LT 4SLB natural gas-fired SI RICE

Primary use: Compress natural gas

Emergency Use: ☐ Yes ☒ No Temporary source: ☐ Yes ☒ No Max. Annual Operating Hours: 8760

Installation Date: 01/10/2017 Manufacture Date: 11/03/2005

Order Date from Manufacturer: 11/03/2005 Modification or Reconstruction Date: _____

Standard Industrial Classification (4-digit SIC Code): 4922 Source Classification Code (8-digit SCC Code): 20200254

B. Emission Unit Description

Manufacturer: Waukesha Model No.: L5794LT Serial No.: C-16160/1

ENGINES & GENERATORS

Manufacturer Certified? ☐ Yes ☒ No

Maximum rated heat input capacity (MMBtu/hr): 10.6

Fuel Consumption (Btu/bhp-hr): 7600

<u>Name Plate Rating</u>	<u>Site Rating</u>
Horsepower: <u>1447</u>	Horsepower: <u>1401</u>
Speed (rpm): <u>1200</u>	Speed (rpm): <u>1200</u>

Check All That Apply:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lean Burn | <input type="checkbox"/> Rich Burn |
| <input checked="" type="checkbox"/> 4 - Stroke Cycle | <input type="checkbox"/> 2 - Stroke Cycle |
| <input checked="" type="checkbox"/> Spark Ignited | <input type="checkbox"/> Compression Ignited |
| <input checked="" type="checkbox"/> Fuel Injected | <input type="checkbox"/> Carbureted |
| <input type="checkbox"/> Turbocharged | <input type="checkbox"/> Naturally Aspirated |
| <input type="checkbox"/> Intercooled (IC) | <input type="checkbox"/> Dual Fuel |

TURBINES

Turbine Type:

- ☐ Simple Cycle
☐ Regenerative
☐ Combined Cycle

Maximum rated heat input capacity (MMBtu/hr): _____

Check All That Apply:

- ☐ Lean Premix Gas-fired
☐ Lean Premix Oil-fired
☐ Diffusion Flame Gas-fired
☐ Diffusion Flame Oil-fired

C. Fuel Data

Primary Fuel Type:	<u>Natural Gas</u>	Back-up Fuel Type: <input type="checkbox"/> N/A	_____
Heat Content (Btu/lb, gal, or scf):	<u>900 btu/scf</u>	Heat Content (BTU/lb, gal, or scf):	_____
Max. Sulfur Content (%):	<u>0.0</u>	Max. Sulfur Content (%):	_____
Max. Ash Content (%):	<u>0.0</u>	Max. Ash Content (%):	_____
Max. Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Max. Annual Fuel Usage Rate:	_____
Max. Hourly Fuel Usage Rate:	<u>0.01 mmscf/yr</u>	Max. Hourly Fuel Usage Rate:	_____
Actual Annual Fuel Usage Rate:	<u>103.6 mmscf/yr</u>	Actual Annual Fuel Usage Rate:	_____

(Note: Rates should be reported as follows: Solid in tons/yr; Liquid in gal/yr, Gaseous in MMscf/yr)

D. Associated Air Pollution Control Equipment☐ N/A

Device type: ☐ NSCR Catalyst ☒ Oxidation Catalyst ☐ Other (describe): _____

Manufacturer: _____ Model No.: _____ Serial No.: _____

Installation date or last modification date: _____ Air/Fuel Ratio Controller? ☒ Yes ☐ No

Air Pollutant(s) Controlled and Control Efficiency: CO (93%)
Example: CO (90%), VOC (45%)

Efficiency estimation method: Emission test data

E. Additional Information Required

On separate sheets of paper include the following:

1. Engine, Turbine, or Generator Manufacturer's site rating and site emission estimates/guaranteed pollutant specific emission factors.
2. Manufacturer specifications for any identified air pollution control units and pollution control guarantees.

☒ N/A**F. Ambient Impact Assessment**

Instructions: This information must be completed when an ambient impact assessment is required for this emissions unit (this is not common).

Stack height (ft): _____	Inside stack diameter (ft): _____
Stack temp (°F): _____	Design stack flow rate (ACFM): _____
Actual stack flow rate (ACFM): _____	Velocity (ft/sec): _____



**SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70**



APPLICATION FORM PTE - POTENTIAL TO EMIT SUMMARY

INSTRUCTIONS: Complete this form once for the facility. For each significant emissions unit with emissions that count towards applicability, list the emissions unit ID and the PTE (in tons/yr) for the air pollutants listed below. If there are other air pollutants not listed below for which the source is a major source, provide an attachment naming the air pollutant and showing a calculation of the PTE for that pollutant. Provide the combined total for all insignificant emissions units (IEUs) in the specified line below. Round all values to the nearest tenth of a ton. Add all values together in each column and enter the total in the space provided at the bottom of the table. Also report these totals in section J of form GIS. Attach all supporting documentation for PTE calculations, including emission factors and any enforceable control reduction efficiencies used.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

Emissions Unit ID	Regulated Air Pollutants							
	NO _x	VOC	SO ₂	PM ₁₀	CO	Lead	HAP	GHGs (Mass-based) (CO ₂ -equivalent)
E1	40.3	5.8	0.0	1.1	56.5	0.0	1.8	6692.2
E2	19.4	12.9	0.0	0.4	34.9	0.0	3.0	5444.2
E3	19.4	12.9	0.0	0.4	34.9	0.0	3.0	5444.2
E4	19.4	12.9	0.0	0.4	34.9	0.0	3.0	5444.2
E5	28.1	13.5	0.0	0.5	24.9	0.0	3.3	5976.0
E6	28.1	13.5	0.0	0.5	24.9	0.0	3.3	5976.0
E7	28.1	13.5	0.0	0.5	24.9	0.0	3.3	5976.0
E8	29.1	13.5	0.0	0.5	24.9	0.0	3.3	5976.0
Total IEUs	1.5	2.5	0.0	0.1	1.3	0.0	0.6	7396.5
TOTAL	212.5	101.2	0.0	4.4	261.9	0.0	25.3	54325.1



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



FORM EMISS - EMISSIONS CALCULATIONS

INSTRUCTIONS: Use this form to calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit identified in section I of form GIS. If form FEE does not need to be submitted with the application you do not need to calculate actual emissions. First, list each air pollutant emitted by the unit that is regulated or for which the source is major and then list any other pollutant subject to regulation. Total HAPs may be simply listed as "Total HAP". Individual HAPs should be listed separately if possible. Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each listed air pollutant. Include all fugitives, including those that do not count towards applicability, when calculating actual emissions. At a minimum, round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values. Attach examples of calculations that illustrate the methodology used.

[illegible]



INSTRUCTIONS: Use this form to calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit identified in section I of form GIS. If form FEE does not need to be submitted with the application you do not need to calculate actual emissions. First, list each air pollutant emitted by the unit that is regulated or for which the source is major and then list any other pollutant subject to regulation. Total HAPs may be simply listed as "Total HAP". Individual HAPs should be listed separately if possible. Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each listed air pollutant. Include all fugitives, including those that do not count towards applicability, when calculating actual emissions. At a minimum, round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values. Attach examples of calculations that illustrate the methodology used.

[illegible]



INSTRUCTIONS: Use this form to calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit identified in section I of form GIS. If form FEE does not need to be submitted with the application you do not need to calculate actual emissions. First, list each air pollutant emitted by the unit that is regulated or for which the source is major and then list any other pollutant subject to regulation. Total HAPs may be simply listed as "Total HAP". Individual HAPs should be listed separately if possible. Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each listed air pollutant. Include all fugitives, including those that do not count towards applicability, when calculating actual emissions. At a minimum, round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values. Attach examples of calculations that illustrate the methodology used.

[illegible]



SOUTHERN UTE INDIAN TRIBE - RESERVATION AIR PROGRAM
APPLICATION FOR TRIBAL OPERATING PERMIT, 40 CFR PART 70



APPLICATION FORM IE - INSIGNIFICANT EMISSIONS

INSTRUCTIONS: List each source of insignificant emissions in the table below. In the "Quantity" column, indicate the number of units qualifying under each description. Each description must be brief but specific enough to describe the source of emissions. List emission units separately if they have dissimilar descriptions, including dissimilar capacities or sizes and other factors. Provide manufacturer emissions specifications, or stack test data when available, including emissions calculations showing that each unit is indeed an insignificant emissions unit.

Facility Name: South Ignacio Central Delivery Point

Facility ID: 08-067-U0033

[illegible]

Applicability Determination

40 CFR Part	Description	Applicable Requirement	Reason
Part 52.21	Prevention of Significant Deterioration	Y	The facility does not belong to any of the 28 source categories. Therefore the potential to emit threshold for determining PSD applicability for the facility is 250 tons of any criteria air pollutant per year and 100,000 tons per year of CO2e. The facility's uncontrolled potential to emit NOx and CO is above major source thresholds; however, it operates under federally enforceable NOx emission limit and is accordingly a synthetic minor NSR source of NOx and a major source of CO. Therefore, the facility is a major NSR source and is subject to 40 CFR part 52.
Part 60	Standards of Performance for New Stationary Sources	--	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which do not apply at the facility but may apply in general to natural gas production, transmission and/or processing facilities include:
Subpart A	<u>General Provisions</u> This rule applies to stationary sources containing an affected facility, the construction or modification of which is commenced after the date of publication in 40 CFR Part 60 of any standard applicable to the facility.	N	As described in the following sections, the facility is not subject to one or more standards of performance for new stationary sources. Therefore the facility is not subject to 40 CFR 60 subpart A.
Subpart Dc	<u>Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units</u> This rule applies to steam generating units [i.e., a device that combusts any fuel and produces steam or heats water or any other heat transfer medium [40 CFR §40.41c]] for which construction, modification, or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of 100 million Btu per hour or less, but greater than or equal to 10 million Btu per hour.	N	The facility has no steam generating units with a maximum design heat input capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr. Therefore the facility is not subject to 40 CFR 60 subpart Dc.
Subpart GG	<u>Standards of Performance for Stationary Gas Turbines</u> This rule applies to stationary gas turbines that commenced construction after October 3, 1977 and before February 18, 2005.	N	The facility has no stationary gas turbines. Therefore the facility is not subject to 40 CFR 60 subpart GG.
Subpart K	<u>Standards of Performance for Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced after June 11, 1973, and prior to May 19, 1978</u>	N	The facility has no storage vessels for petroleum liquids for which construction, reconstruction, or modification occurred after June 11, 1973, and prior to May 19, 1978. Therefore the facility is not subject to 40 CFR 60 subpart K.
Subpart Ka	<u>Standards of Performance for Storage Vessels for Petroleum Liquids for which Construction, Reconstruction, or Modification Commenced after May 18, 1978, and prior to July 23, 1984</u>	N	The facility has no storage vessels for petroleum liquids for which construction, reconstruction, or modification occurred after May 18, 1978, and prior to July 23, 1984. Therefore the facility is not subject to 40 CFR 60 subpart Ka.
Subpart Kb	<u>This rule applies to storage vessels with a capacity greater than or equal to 75 m3 [~471.7 bbl or ~19,813 gal] that are used to store Volatile Organic Liquids for which construction, reconstruction, or modification commenced after July 23, 1984.</u>	N	The facility has no storage vessels for VOL that were constructed after July 23, 1984, with a capacity greater than or equal to 75 m3 (19,800 gal) or with a vapor pressure at or above 15 kPa. Therefore, the facility is not subject to 40 CFR 60 subpart Kb.
Subpart KKK	<u>Standards of Performance for Equipment Leaks of VOC from Onshore Natural Gas Processing Plants for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011</u> This rule applies to affected facilities in onshore natural gas processing plants (i.e., any processing site engaged in the extraction of natural gas liquids from field gas, fractionation of mixed natural gas liquids to natural gas products, or both [§60.631]).	N	The facility does not extract natural gas liquids from field gas or fractionate mixed natural gas liquids to natural gas products. Therefore, the facility is not subject to 40 CFR 60 subpart KKK.
Subpart LLL	<u>Standards of Performance for SO2 Emissions From On-Shore Natural Gas Processing for Which Construction, Reconstruction, or Modification Commenced After January 20, 1984, and on or Before August 23, 2011</u> This rule applies to affected facilities that process natural gas: each sweetening unit and each sweetening unit followed by a sulfur recovery unit.	N	The facility has no sweetening or sulfur recovery units. Therefore, the facility is not subject to 40 CFR part 60, subpart LLL.
Subpart IIII	<u>Standards of Performance for Stationary Compression Ignition Internal Combustion Engines</u> This rule applies to owner/operators of compression ignition (CI) internal combustion engines (ICE) that commence construction, modification, or reconstruction after July 11, 2005, where the stationary CI ICE are manufactured after April 1, 2006.	N	The facility has no compression ignition internal combustion engines. Therefore, the facility is not subject to 40 CFR 60, subpart IIII.
Subpart JJJJ	<u>Standards of Performance for Stationary Spark Ignition Internal Combustion Engines</u> This rule applies to owner/operators of spark ignition (SI) internal combustion engines (ICE) that commence construction after June 12, 2006, where the SI ICE is manufactured: a. on or after July 1, 2007, for SI ICE with max rating ≥500 HP (except lean burn engines with max rating 500 ≤ HP < 1,350 HP; b. on or after January 1, 2008 for lean burn engines with max rating 500 ≤ HP < 1,350 HP; c. on or after July 1, 2008 for engines with max rating < 500 HP; or d. on or after January 1, 2009 for emergency engines with a maximum engine power > 25 hp.	N	Units E1-E8 are >500 hp RICE that commenced constrution prior to June 12, 2006 and were manufactured prior to July 1, 2007. Therefore, these units are not subject to 40 CFR Part 60, subpart JJJJ.
Subpart KKKK	<u>Standards of Performance for Stationary Combustion Turbines</u> This rule applies to stationary combustion turbines and any associated heat recovery steam generator for units that commence construction, modification, or reconstruction after February 18, 2005.	N	The facility has no stationary combustion turbines. Therefore, the facility is not subject to 40 CFR 60 subpart KKKK.
Subpart OOOO	<u>Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution for which Construction , Modification or Reconstruction Commenced after August 23, 2011, and on or before September 18, 2015</u> This rule establishes emission standards and compliance schedules for control of VOC and SO2 emissions from affected facilities that commence construction, modification or reconstruction after August 23, 2011, and on or before September 18, 2015. Affected facilities include natural gas wells, centrifugal compressors, reciprocating compressors (unless located at a well site or an adjacent well site and servicing more than one well site), natural gas-driven continuous-bleed pneumatic devices, storage vessels, and onshore natural gas processing plants.	N	The facility is not a natural gas processing plant and does not include gas wells, storage vessels, continuous-bleed pneumatic devices, or compressors that have been constructed, modified, or reconstructed after August 23, 2011, and on or before September 18, 2015. Therefore, the facility is not subject to 40 CFR 60, subpart OOOO.
Subpart OOOOa	<u>Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction , Modification or Reconstruction Commenced after September 18, 2015</u> This rule establishes emission standards and compliance schedules for the control of the pollutant GHG, VOC, and SO2 emissions from affected facilities that commence construction, modification, or reconstruction after September 18, 2015.	N	The facility is not a natural gas processing plant and does not include gas wells, storage vessels, or continuous-bleed pneumatic devices that have been constructed, modified, or reconstructed after September 18, 2015.
Part 63	National Emission Standards for Hazardous Air Pollutants for Source Categories	--	Most of the standards set forth by these regulations do not apply to the facility because no applicable units exist at the facility. Specific standards which do not apply at the facility but may apply in general to natural gas production, transmission and/or processing facilities include:
Subpart A	<u>General Provisions</u> This rule applies to stationary sources containing an affected facility, the construction or modification of which is commenced after the date of publication in 40 CFR Part 63 of any standard applicable to the facility.	Y	As described in the following sections, the facility is subject to one or more standards of performance for new stationary sources. Therefore, the facility is subject to 40 CFR 60 subpart A.

Applicability Determination

40 CFR Part	Description	Applicable Requirement	Reason
Subpart HH	<u>National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities</u> This rule applies to natural gas production facilities that process, upgrade, or store natural gas prior to the point at which the natural gas enters the natural gas transmission or storage source category or is delivered to the final end user. Affected sources include triethylene glycol (TEG) dehydration units located at area sources of HAP and; for major sources of HAP, each TEG dehydration unit and storage vessel (with a potential for flash emissions) and, for natural gas processing plants, the group of ancillary equipment, except compressors, intended to operate in volatile hazardous air pollutant service (as defined in §63.761).	Y	The facility is located prior to the point of custody transfer and is considered a production field facility under the subpart. The included GRI-GLYCalc 4.0 calculations demonstrate uncontrolled actual average benzene emissions from the TEG dehydration unit are less than 0.9 megagrams per year. Therefore, per §63.764(e)(1)(ii), the TEG dehydration unit is exempt from the general standards for area sources at §63.764(d). However, recordkeeping requirements apply to the facility.
Subpart HHH	<u>National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilities</u> This rule applies to natural gas transmission and storage facilities that are major sources of HAP emissions and that transport or store natural gas prior to entering the pipeline to a local distribution company or a final end user.	N	The facility is not a natural gas transmission or storage facility. Therefore, the facility is not subject to 40 CFR 63, subpart HHH.
Subpart ZZZZ	<u>National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines</u> This rule establishes national emission limitations and operating limitations for HAP emitted from stationary reciprocating internal combustion engines (RICE).	Y	Unit E1 is a non-emergency > 500 hp 4SRB SI RICE located at a major source of HAP and constructed after December 19, 2002. Therefore, this unit is subject to the requirements of 40 CFR part 63, subpart ZZZZ. Units E2-E4 are non-emergency > 500 hp 4SLB SI RICE located at a major source of HAP and constructed prior to December 19, 2002. Therefore, these units are not subject to the requirements of 40 CFR part 63, subpart ZZZZ. Units E5-E8 are non-emergency > 500 hp 4SLB SI RICE located at a major source of HAP and constructed after December 19, 2002. Therefore, these units are subject to the requirements of 40 CFR part 63, subpart ZZZZ.
Subpart DDDD	<u>National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters</u> This rule applies to <i>industrial, commercial and institutional boilers</i> and <i>process heaters</i> that are located at a major source of HAP as defined in §63.2 or §63.761. TEG reboilers are not subject to this rule as they are listed as an affected source under subpart HH, per §63.7491(h). <i>Industrial boiler</i> means a boiler used in manufacturing, processing, mining, and refining or any other industry to provide steam, hot water, and/or electricity. <i>Commercial/institutional boiler</i> means a boiler used in commercial establishments or institutional establishments such as medical centers, research centers, institutions of higher education, hotels, and laundries to provide electricity, steam, and/or hot water. <i>Boiler</i> means an enclosed device using controlled flame combustion and having the primary purpose of recovering thermal energy in the form of steam or hot water. Waste heat boilers are excluded from this definition. <i>Process heater</i> means an enclosed device using controlled flame, that is not a boiler, and the unit's primary purpose is to transfer heat indirectly to a process material (liquid, gas, or solid) or to a heat transfer material for use in a process unit, instead of generating steam. Process heaters are devices in which the combustion gases do not directly come into contact with process materials. Process heaters do not include units used for comfort heat or space heat, food preparation for on-site consumption, or autoclaves.	N	The facility has no industrial, commercial, or institutional boilers as defined in this subpart. Therefore, the facility is not subject to 40 CFR 63, subpart DDDDD.
Subpart JJJJJ	<u>National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources</u> This rule applies to industrial, commercial, and institutional boilers that are located at area sources of HAP as defined in §63.2. TEG reboilers are not subject to this rule as they are listed as an affected source under subpart HH, per §63.11195(b).	N	The facility has no industrial, commercial, or institutional boilers as defined in this subpart. Therefore, the facility is not subject to 40 CFR 63, subpart JJJJJJ.
Part 64	<u>Compliance Assurance Monitoring</u> This rule applies to pollutant-specific emission units that are required to obtain a Part 70 permit if the unit satisfies the following criteria (per 40 CFR §64.2(a)(1-3): 1) Each unit that, by itself, has potential, pre-controlled emissions that are equal to or greater than the major source thresholds for an applicable regulated air pollutant and that is subject to an emission limitation or standard for the applicable regulated air pollutant; and 2) the unit uses a control device to achieve compliance with any such limitation or standard.	N	The facility has no units with potential emissions equal to or greater than the major source thresholds for an applicable regulated air pollutant. Therefore, the facility is not subject to 40 CFR part 64.
Part 68	<u>Chemical Accident Prevention Provisions</u> This rule applies to stationary sources that have more than a threshold quantity of a regulated substance in a process. Regulated substances include 77 toxic and 63 flammable substances, which are potentially present in the natural gas stream entering the facility and in the storage vessels located at the facility. The quantity of a regulated substance in a process is determined according to procedures presented under §68.115: - §68.115(b)(1) and (2)(i) indicate that toxic and flammable substances in a mixture do not need to be considered when determining whether more than a threshold quantity is present at a stationary source if the concentration of the substance is below one percent by weight of the mixture. - §68.115(b)(2)(iii) indicates that prior to entry into a natural gas processing plant, regulated substances in naturally occurring hydrocarbon mixtures need not be considered when determining whether more than a threshold quantity is present at a stationary source. Naturally occurring hydrocarbon mixtures include <i>condensate, field gas, and produced water</i> . <i>Condensate</i> is defined under this subpart as the hydrocarbon liquid separated from natural gas that condenses because of changes in temperature, pressure, or both, and remains liquid at standard conditions. <i>Field gas</i> is defined under this subpart as gas extracted from a production well before the gas enters a natural gas processing plant. <i>Produced water</i> is defined under this subpart as water separated from natural gas after extraction.	N	No substance listed by this regulations is stored at the facility in quantities above the applicable threshold values set forth by the regulation. Therefore, the facility is not subject to 40 CFR part 68.
Part 82	Protection of Stratospheric Ozone	--	Most of the standards set forth by these regulations do not apply to the facility because no applicable units or processes exist at the facility. Specific standards which do not apply at the facility but may apply in general to natural gas production, transmission and/or processing facilities include:
Subpart F	<u>Recycling and Emissions Reduction</u> The purpose of this rule is to reduce emissions of class I and class II refrigerants and their non-exempt substitutes to the lowest achievable level by maximizing the recapture and recycling of such refrigerants during the maintenance, service, repair and disposal of equipment containing the controlled substances.	N	There facility does not engage in any activities regulated under the subpart and has no equipment containing CFC's. Therefore, the requirements of 40 CFR part 82, subpart H are not applicable.

Applicability Determination

40 CFR Part	Description	Applicable Requirement	Reason
Subpart H	<u>Halon Emissions Reduction</u> The purpose of this rule is to reduce emissions of halon by banning the intentional release of halons during repair, testing, and disposal of equipment containing halons.	N	There facility does not engage in any activities regulated under the subpart and has no equipment containing halon. Therefore, the requirements of 40 CFR part 82, subpart H are not applicable.
Part 98	<u>Mandatory Greenhouse Gas Reporting</u> This rule requires owners and operators of facilities that contain petroleum and natural gas and emit 25,000 metric tons or more of CO2e per year from process operations, stationary combustion, miscellaneous use of carbonates, and other source categories to report those emissions. Part 98 defines petroleum and natural gas facilities to which the 25,000 ton per year threshold applies as follows: 1) For the onshore petroleum and natural gas production industry segment, a facility is defined generally as all emission source types on a single well pad or associated with a single well pad and CO2 EOR operations that are under common ownership or control in a single hydrocarbon basin, as defined by the American Association of Petroleum Geologists. 2) For onshore natural gas processing industry segment, natural gas processing means the separation of natural gas liquids (NGLs) or non-methane gases from produced natural gas, or the separation of NGLs into one or more component mixtures. This segment also includes all residue gas compression equipment owned or operated by the natural gas processing plant. This industry segment includes processing plants that fractionate gas liquids, and processing plants that do not fractionate gas liquids but have an annual average throughput of 25 MMscf per day or greater. 3) For the onshore petroleum and natural gas gathering & boosting industry segment, a facility is defined generally as gathering pipelines and other equipment used to collect and/or treat petroleum and/or natural gas from onshore production wells for transport to a natural gas processing facility, a natural gas transmission pipeline or to a natural gas distribution pipeline. This segment covers sources that are not included in equipment reported under any other industry segment defined in this section. A gathering and boosting facility includes equipment and operations that are under common ownership or control in a single hydrocarbon basin, as defined by the American Association of Petroleum Geologists. 4) For all other industry segments, the facility definition is the same as what is defined in the General Provisions to part 98. Under this definition, a facility is defined generally as all sources for which emission calculation methods are provided in 40 CFR part 98 (including those in Table 1) and that are located on a contiguous property and under common ownership or common control.	Y	The facility does emits 25,000 metric tons or more of CO ₂ e per year. Therefore, the facility is subject to 40 CFR part 98.

Potential-to-Emit (PTE) Summary
South Ignacio Central Delivery Point
Red Cedar Gathering Company

Significant Emission Units			Emissions (tons/yr)									
Unit ID	Description	Rating	NO_x	VOC	PM₁₀	CO	Total HAP	HCHO	Benzene	CO₂	Methane	CO₂e (MT/yr)
E1	Waukesha L7044GSI - Internal Combustion Engine (4SRB)	1,680 site-rated hp	40.3	5.8	1.1	56.5	1.8	1.2	0.0	6,359.8	13.3	6,692.2
E2	Waukesha L7042 GL - Internal Combustion Engine (4SLB)	1,337 site-rated hp	19.4	12.9	0.4	34.9	3.0	2.2	0.0	4,673.5	53.1	5,444.2
E3	Waukesha L7042 GL - Internal Combustion Engine (4SLB)	1,337 site-rated hp	19.4	12.9	0.4	34.9	3.0	2.2	0.0	4,673.5	53.1	5,444.2
E4	Waukesha L7042 GL - Internal Combustion Engine (4SLB)	1,337 site-rated hp	19.4	12.9	0.4	34.9	3.0	2.2	0.0	4,673.5	53.1	5,444.2
E5	Waukesha L5794LT - Internal Combustion Engine (4SLB)	1,401 site-rated hp	28.1	13.5	0.5	24.9	3.3	2.5	0.0	5,130.0	58.3	5,976.0
E6	Waukesha L5794LT - Internal Combustion Engine (4SLB)	1,401 site-rated hp	28.1	13.5	0.5	24.9	3.3	2.5	0.0	5,130.0	58.3	5,976.0
E7	Waukesha L5794LT - Internal Combustion Engine (4SLB)	1,401 site-rated hp	28.1	13.5	0.5	24.9	3.3	2.5	0.0	5,130.0	58.3	5,976.0
E8	Waukesha L5794LT - Internal Combustion Engine (4SLB)	1,401 site-rated hp	28.1	13.5	0.5	24.9	3.3	2.5	0.0	5,130.0	58.3	5,976.0
Subtotal Significant Emission Units			210.9	98.7	4.3	260.6	24.4	17.8	0.2	40,900.2	405.8	46,928.6

Insignificant Emission Units (IEU)			Emissions (tons/yr)									
Unit ID	Description	Rating	NO_x	VOC	PM₁₀	CO	Total HAP	HCHO	Benzene	CO₂	Methane	CO₂e (MT/yr)
D1	TEG Dehydrator	30 MMscfd	0.0	1.2	0.0	0.0	0.3	0.0	0.3	40.9	3.7	120.3
D2	TEG Dehydrator	40 MMscfd	0.0	1.1	0.0	0.0	0.4	0.0	0.4	19.1	17.6	415.9
TK-501	Used oil storage tank	500 bbl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-502	Used oil storage tank	500 bbl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-503	Dehy still vent drain tank	95 bbl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-504	Lubricating oil storage tank (E1)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-505	Lubricating oil storage tank (E2)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-506	Lubricating oil storage tank (E3)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-507	Lubricating oil storage tank (E4)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-508	Lubricating oil storage tank (E5)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-509	Lubricating oil storage tank (E6)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-510	Lubricating oil storage tank (E7)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-511	Lubricating oil storage tank (E8)	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-512	Used oil storage tank (E1)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-513	Used oil storage tank (E2)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-514	Used oil storage tank (E3)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-515	Used oil storage tank (E4)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-516	Used oil storage tank (E5)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-517	Used oil storage tank (E6)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-518	Used oil storage tank (E7)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-519	Used oil storage tank (E8)	250 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-520	Ethylene glycol storage tank	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-521	TEG storage tank	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TK-522	TEG storage tank	500 gal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RB1	TEG dehydrator reboiler heater (D1)	1.750 MMBtu/hr	0.9	0.0	0.1	0.7	0.1	0.0	0.0	1,022.0	0.0	927.6
RB2	TEG dehydrator reboiler heater (D2)	0.750 MMBtu/hr	0.4	0.0	0.0	0.3	0.0	0.0	0.0	438.0	0.0	397.5
H-101	Used oil storage tank heater (TK-501)	0.325 MMBtu/hr	0.2	0.0	0.0	0.1	0.0	0.0	0.0	189.8	0.0	172.3
H-102	Used oil storage tank heater (TK-502)	0.325 MMBtu/hr	0.2	0.0	0.0	0.1	0.0	0.0	0.0	189.8	0.0	172.3
H-103	Catalytic heater	0.008 MMBtu/hr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	4.2
FUG	Fugitive Emissions	--	0.0	0.1	0.0	0.0	0.0	0.0	0.0	10.2	207.0	5,186.3
Subtotal Insignificant Emission Units			1.5	2.5	0.1	1.3	0.9	0.0	0.7	1,914.4	228.3	7,396.5
Total			212.5	101.2	4.4	261.9	25.3	17.8	0.9	42,814.6	634.1	54,325.1

Waukesha L7044GSI Emission Calculations

South Ignacio Central Delivery Point

Red Cedar Gathering Company

Waukesha L7044GSI - Internal Combustion Engine (4SRB)

Unit E1

Manufacturer Unit Rating:	1,680	hp @ 1,200 rpm
Site Specific Unit Rating ^a :	1,680	hp @ 6,320 ft
BSFC:	7,881	btu/hp-hr
Maximum Heat Input:	13.2	MMBtu/hr
Operating Schedule:	8,760	hr/yr
Maximum Fuel Use ^b :	128.5	mmscf/yr

^a Based on manufacturer's site derate of 2% for every 1,000 ft above 8,000 ft elevation.

^b Based on LHV of: 900 btu/scf

Potential Criteria Pollutant Emissions

Pollutant	Uncontrolled Emissions			
	Emission Factors	Data Source	(lb/hr)	(ton/yr)
NO _x	13.30 g/hp-hr	Engine Manufacturer	49.26	215.76
CO	11.20 g/hp-hr	Engine Manufacturer	41.48	181.69
VOC	0.36 g/hp-hr	Engine Manufacturer	1.33	5.84
PM ₁₀	1.94E-02 lb/MMBtu	AP-42, Table 3.2-3	0.26	1.12
SO ₂	5.88E-04 lb/MMBtu	AP-42, Table 3.2-3	0.01	0.03
CO ₂	110.0 lb/MMBtu	AP-42, Table 3.2-3	1,452.00	6,359.76
Methane	0.23 lb/MMBtu	AP-42, Table 3.2-3	3.04	13.30
CO ₂ e	--	--	--	6,692.2 MT/yr

Federally Enforceable Emissions

Pollutant	Controlled Emissions			
	Emission Factors	Data Source	(lb/hr)	(ton/yr)
NO _x	2.48 g/hp-hr	Calculated (based on	9.20	40.30
CO	3.48 g/hp-hr	SMNSR lb/hr limits)	12.90	56.50

Hazardous Air Pollutant (HAP) Emissions

Pollutant	Emission Factors ^c	Data Source	Uncontrolled Emissions	
			(lb/hr)	(ton/yr)
1,3-Butadiene	6.63E-04 lb/MMBtu	AP-42, Table 3.2-3	8.75E-03	3.83E-02
Acetaldehyde	2.79E-03 lb/MMBtu	AP-42, Table 3.2-3	3.68E-02	0.16
Acrolein	2.63E-03 lb/MMBtu	AP-42, Table 3.2-3	3.47E-02	0.15
Benzene	1.58E-03 lb/MMBtu	AP-42, Table 3.2-3	2.09E-02	9.13E-02
Formaldehyde	2.05E-02 lb/MMBtu	AP-42, Table 3.2-3	2.71E-01	1.19
Methanol	3.06E-03 lb/MMBtu	AP-42, Table 3.2-3	4.04E-02	0.18
Toluene	5.58E-04 lb/MMBtu	AP-42, Table 3.2-3	7.37E-03	3.23E-02
Xylene	1.95E-04 lb/MMBtu	AP-42, Table 3.2-3	2.57E-03	1.13E-02
Total	--		< 0.42	< 1.85

^c Uncontrolled emission factors for 4-stroke, rich-burn (4SRB) engines based on the highest emission factor between EPA's AP-42, GRI field data and GRI literature data sets, and the manufacturer's data.

STANDARD EQUIPMENT

AIR CLEANER - Two, dry type with rain shield and service indicator.

BARRING DEVICE - Manual.

BEARINGS - Heavy duty, replaceable, precision type.

BREATHER - Closed system.

CONNECTING RODS - Drop forged steel, rifle drilled.

CONTROL SYSTEM - Pneumatic. Includes pilot operated valves for air start and prelude. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.

CRANKCASE - Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.

CRANKSHAFT - Forged steel, seven main bearings, counterweighted and dynamically balanced.

CYLINDERS - Removable wet type cylinder liners, chrome plated on outer diameter.

CYLINDER HEADS - Twelve interchangeable. Four valves per cylinder, with water cooled exhaust valve seats. Roller valve lifters and hydraulic push rods. Flange mounted ignition coils.

ENGINE MONITOR DEVICES - Thermocouples, K-type, are wired to a bulk head connector for jacket water temperature, lube oil temperature and intake manifold temperature. 25 foot (7.6 m) customer interface and standard thermocouple harnesses are provided for making connections to a customer supplied panel. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.

ENGINE ROTATION - Counterclockwise when facing flywheel.

FLYWHEEL - Approx. $WR^2 = 155000 \text{ lb-in}^2$, with ring gear (208 teeth), machined to accept two drive adapters: 31.88" (810 mm) pilot bore, 30.25" (768 mm) bolt circle, (12) 0.75"-10 tapped holes; or 28.88" (734 mm) pilot bore, 27.25" (692 mm) bolt circle, (12) 0.625"-11 tapped holes and (12) 0.75"-10 tapped holes.

FLYWHEEL HOUSING - No. 00 SAE.

FUEL SYSTEM - Two natural gas, 4" (102 mm) updraft carburetors and two Fisher Model 99, 2" (51 mm) gas regulators, mounted. 25 psi (172 kPa) fuel inlet pressure required.

GOVERNOR - Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.

IGNITION SYSTEM - Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.

INTERCOOLER - Air-to-water.

LEVELING BOLTS

LIFTING EYES - Requires 9.5 ton Working Load Limit (W.L.L.) anchor shackles.

LUBRICATION - Full pressure, gear type pump. Full flow lube oil filter with replaceable depth-type elements and flexible connections, shipped loose. MICROSPIN® bypass filter, engine mounted. Lube oil strainer, mounted. Air/gas motor driven prelude pump, requires final piping.

MANIFOLDS - Exhaust, (2) water cooled.

OIL COOLER - Shell and tube type, with thermostatic temperature controller and pressure regulating valve. Factory mounted.

OIL PAN - Base type. 90 gallon (340 L) capacity, including filter and cooler.

PAINT - Oilfield orange primer.

PISTONS - Aluminum with floating pin. Oil cooled. 8:1 compression ratio.

SHIPPING SKID - Steel for domestic truck or rail.

TURBOCHARGERS - (2) with water-cooled bearing housing and adjustable wastegates. Single vertical exhaust outlet at rear. Flexible stainless steel exhaust connection with 8" (203 mm) pipe flange.

VIBRATION DAMPER - Viscous type.

WATER CIRCULATING SYSTEM

Auxiliary Circuit - Belt driven water circulating pump for intercooler and lube oil cooler.

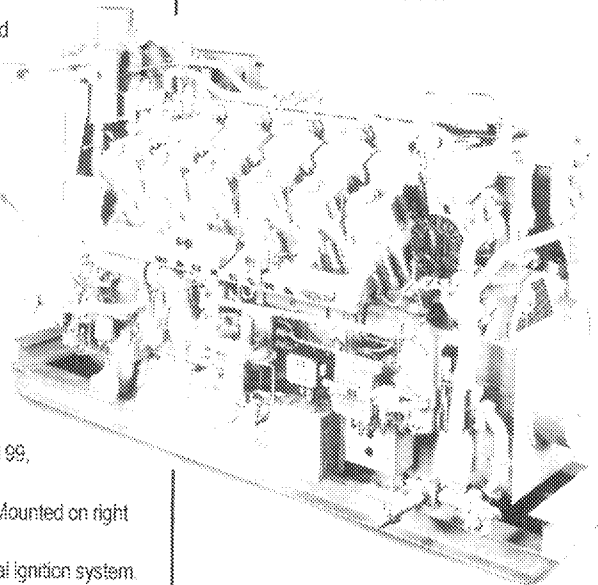
Engine Jacket - Belt driven water circulating pump. Cluster type thermostatic temperature regulating valve, full flow bypass type with 165° - 170° F (74° - 77° C) start to open thermostats. Flange connections and mating flanges for (2) 4" (102 mm) inlets and (1) 5" (127 mm) outlet.

WAUKESHA CUSTOM ENGINE CONTROL, DETONATION SENSING MODULE (DSM) - includes individual cylinder sensors, Detonation Sensing Module, filter and cables. Compatible with Waukesha CEC Ignition Module only. Detonation Sensing Module and filter are mounted and wired. Packager is responsible for 24V DC power supply and ground to the DSM. The DSM meets Canadian Standards Association Class I, Division 2, Group D hazardous location requirements.

Waukesha
SERIES FOUR
VHP

L7044GSI

VHP™ Series Four
1120 - 1680 BHP



Model L7044GSI Turbocharged and Intercooled, Twelve Cylinder, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders V 12	Lube Oil Capacity 90 gal. (340 L)
Piston Displacement 7040 cu. in. (115 L)	Starting System 125 - 150 psi air/gas 24/32 V electric
Bore & Stroke 9.375" x 5.9" (238 x 216 mm)	Dry Weight 22,750 lb. (10,320 kg)
Compression Ratio 8:1	
Jacket Water System Capacity 107 gal. (405 L)	

® ISO 9001
CERTIFIED

CONTINUOUS POWER RATINGS: L7044GSI VHP SERIES FOUR

Model	I.C. Water Inlet Temp. °F (°C) (T _{cr})	C.R.	Brake Horsepower (kWb Output)				
			800 rpm	900 rpm	1000 rpm	1100 rpm	1200 rpm
L7044GSI	130° (54°)	8:1	1120 (836)	1260 (940)	1400 (1044)	1540 (1149)	1680 (1253)

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature T_{cr} (clause 10.1) as specified above limited to ± 10° F (± 5° C). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/m³) SLHV value, with a 91 Waukesha Knock Index®.

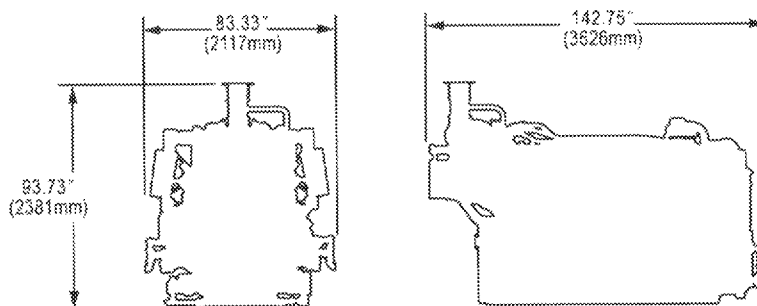
For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

PERFORMANCE: L7044GSI VHP SERIES FOUR

English 130° F I.C. Water Temperature			Metric 54° C I.C. Water Temperature		
Pre-Catalyst Settings	RPM	1200 1000	Pre-Catalyst Settings	RPM	1200 1000
	Power (Bhp)	1680 1400		Power (kWb)	1253 1044
	BSFC (Btu/bhp-hr)	7780 7685		BSFC (kJ/kW-hr)	11009 10874
	NOx (grams/bhp-hr)	12.6 12.1		NOx (g/nm ³)	4.7 4.5
	CO (grams/bhp-hr)	13.8 12.2		CO (g/nm ³)	5.1 4.5
	NMHC (grams/bhp-hr)	0.36 0.36		NMHC (g/nm ³)	0.13 0.13
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	7595 7535	Low Fuel Consumption Settings	BSFC (g/nm ³)	10747 10662
	NOx (grams/bhp-hr)	21.3 20.7		NOx (g/nm ³)	7.9 7.7
	CO (grams/bhp-hr)	1.6 1.6		CO (g/nm ³)	0.6 0.6
	NMHC (grams/bhp-hr)	0.30 0.30		NMHC (g/nm ³)	0.11 0.11

NOTES:

- Fuel consumption and exhaust emissions are based on ISO 3046/1-1995 standard reference conditions and commercial quality natural gas of 900 Btu/ft³ (35.38 MJ/m³ [25, V(0; 101.325)]) saturated lower heat value. Waukesha Knock Index® of 91 and 93% methane content by volume. ISO 3046/1-1995 standard reference conditions are 77°F (25°C) ambient temperature, 29.54 inches Hg (100 kPa) barometric pressure, 30% relative humidity (1kPa/0.3 inches Hg water vapor pressure).
- S.I. exhaust emissions are corrected to 5% O₂ (0°C and 101.325 kPa).
- Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



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Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

Adjustments To Engine And Enginator Systems For High Altitude And High Temperature^{12, 15} For Natural Gas, Low BTU and HD-5 Propane Fuels Continued

Turbocharged and Intercooled			Continuous/ Prime Power*	Intermittent/ Standby
VHP F3521/L5790 L7042/P9390GSI	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 1% for each 10°F (5.5°C) above:	6000 ft. 1828 m 100°F 38°C	1500 ft. 457 m 100°F 38°C
VHP F3514/F3524/L5794/L7044GSI ¹³	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 1% for each 10°F (5.5°C) above:	8000 ft. 2438 m 100°F 38°C	4000 ft. 1219 m 100°F 38°C
VHP GL	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 1% for each 10°F (5.5°C) above:	1500 ft. 457 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP L5774LT ¹⁴	Altitude: Temperature ¹⁷ :	Deduct 2.4% for each 1000 ft. (305 m) above: Deduct 2.4% for each 10°F (5.5°C) above:	5000 ft. 1524 m 100°F 38°C	— — — —
VHP L5794LT	Altitude: Temperature ¹⁷ :	Deduct 2.4% for each 1000 ft. (305 m) above: Deduct 2.4% for each 10°F (5.5°C) above:	5000 ft. 1524 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP F3521/L5790/L7042GL with Low Fuel Pressure System Option	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 4% for each 10°F (5.5°C) above:	1500 ft. 457 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP F3521/L5790/L7042GSI with Low Fuel Pressure System Option	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 4% for each 10°F (5.5°C) above:	3000 ft. 914 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP F3524/L5794/L7044GSI with Low Fuel Pressure System Option	Altitude: Temperature ¹⁷ :	Deduct 2% for each 1000 ft. (305 m) above: Deduct 4% for each 10°F (5.5°C) above:	3000 ft. 914 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP L5794LT with Low Fuel Pressure System Option	Altitude: Temperature ¹⁷ :	Deduct 4.8% for each 1000 ft. (305 m) above: Deduct 4.8% for each 10°F (5.5°C) above:	1500 ft. 457 m 100°F 38°C	1500 ft. 457 m 85°F 29°C
VHP GSI and GL HD-5/Propane (Including 3524/5794/7044GSI ¹³)	Altitude: Altitude: Altitude: Temperature ¹⁷ : Jacket Water Temp.:	Deduct 2% for each 1000 ft. (305 m) above (GL only): Deduct 2% for each 1000 ft. (305 m) above (GSI only): Deduct 2% for each 1000 ft. (305 m) above (Series Four GSI only): Deduct 1% for each 10°F (5.5°C) above: Deduct 2.5% for each 10°F (5.5°C) above:	1500 ft. 457 m 6000 ft. 1828 m 8000 ft. 2438 m 100°F 38°C 180°F 82°C	— — — — — — — — — —
APG 16V150LTD	Altitude: Temperature ¹⁷ :	Contact Waukesha Application Engineering above: Contact Waukesha Application Engineering above:	1500 ft. 457 m 100°F 38°C	— — — —
APG 12V220GL APG 18V220GL	Altitude: Temperature ¹⁷ :	Contact Waukesha Application Engineering Contact Waukesha Application Engineering	— — — —	— — — —
8L-AT27GL	Altitude:	Deduct 3.3% for each 1000 ft. (305 m) above:	3000 ft. 914 m	800 ft. 244 m
12V-AT27GL	Temperature ¹⁷ :	Deduct 2% for each 10°F (5.5°C) above:	100°F 38°C	100°F 38°C
16V-AT27GL GC	Altitude: Temperature ¹⁷ :	Deduct 4% for each 1000 ft. (305 m) above: Deduct 2% for each 10°F (5.5°C) above:	6000 ft. 1828 m 100°F 38°C	6000 ft. 1828 m 100°F 38°C
16V-AT27GL EPG	Altitude: Temperature ¹⁷ :	Contact Waukesha Application Engineering above: Contact Waukesha Application Engineering above:	1000 ft. 305 m 100°F 38°C	800 ft. 244 m 100°F 38°C
Naturally Aspirated				
All VHP, VGF and VSG Natural Gas	Altitude: Temperature ¹⁷ :	Deduct 3% for each 1000 ft. (305 m) above: Deduct 1% for each 10°F (5.5°C) above:	1500 ft. 457 m 100°F 38°C	500 ft. 152 m 85°F 29°C
All VHP, VGF, VSG HD-5/Propane	Altitude: Temperature ¹⁷ : Jacket Water Temp.:	Deduct 3% for each 1000 ft. (305 m) above: Deduct 5.5% for each 10°F (5.5°C) above: Deduct 2.5% for each 10°F (5.5°C) above:	1500 ft. 457 m 100°F 38°C 180°F 82°C	— — — — — —

NOTES:

Rating Standard: All models: Ratings conform to ISO 3046/1 (latest version) with a mechanical efficiency of 90% and auxiliary water temperature, Tora, as specified in the Power Rating Chart, Bulletin 1079 (latest version) limited to ±10° F (±5.5° C). Ratings are also valid for SAE J1349, BS 5514, DIN 6271 and API 7B-11C standard atmospheric reference conditions.

Fuel Standard: All natural gas engine ratings are based on 900 BTU/lb¹ (35.38 MJ/m³ [25, V(0; 101.325)]) SLHV, 91 WK1TM minimum, commercial quality natural gas. Refer to S-7884-7 (latest version) for full gaseous fuel specifications.

ISO Standard Power (Continuous Power Rating): The highest load and speed that can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance at ISO standard ambient reference conditions. At ISO standard ambient reference conditions, it is permissible to operate the engine at up to 110% of the ISO Standard Power or the maximum power indicated by the intermittent rating, whichever is lower, for two hours in every 24 hour period.

ISO Service Power (Site Continuous Power Rating): The highest load and speed that can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance at the operating and ambient conditions of the site application. Unless otherwise stated, it is permissible to operate the engine at up to 110% of the ISO Service Power (see the Overload Power definition) or the intermittent power rating available at the site operating and ambient conditions, whichever is lower, for two hours in every 24 hour period.

Overload Power: The power that an engine is permitted to supply, with a duration and frequency of use depending upon the service application, at stated ambient conditions, immediately after operating at its ISO Service Power rating. Unless otherwise stated, it is permissible to operate the engine at up to 110% of the ISO Service Power or the intermittent power rating available at the site operating and ambient conditions, whichever is lower, for two hours in every 24 hour period. For situations without a defined intermittent power, the allowable 10% overload power is reduced from ISO standard ambient reference conditions by the applicable rating adjustments listed in the Intermittent/Standby Power column.

Intermittent Power Rating: The highest load and speed that can be applied in variable speed mechanical system applications only. Operation at this rating is limited to a maximum of 3500 hours per year.

Generator Continuous Power Rating (kWe): The highest load and speed which can be applied 24 hours per day, seven days per week, 365 days per year except for normal maintenance. Unless otherwise stated, it is permissible to operate the engine at up to 110% of the generator continuous power rating for two hours in every 24 hour period.

Generator Standby Power Rating (kWe): This rating applies to those systems used as a secondary source of electrical power. This rating is the output the system will produce continuously 24 hours per day for the duration of the prime power source outage. No overload is allowed. This rating may reduce the lifecycle intervals.

Generator Peak Shaving Application Rating (kWe) For VHP Models Only: This rating is based on the number of horsepower-hours available per year in a constant speed application at site conditions. This rating allows for limited engine operation above the published ISO Standard Power rating for VHP models only. This rating class requires a Special Application Approval. Contact Waukesha's Sales Engineering Department. This rating may reduce the lifecycle intervals.

¹² These altitude and temperature adjustments are meant to be a guide only and cannot be applied without limit. Contact Waukesha's Sales Engineering Department for additional information.

¹³ The F3514GSI/F3524GSI, L5794GSI, and L7044GSI models are limited to 180°F maximum jacket water temperature.

¹⁴ The L5774LT is rated for 130°F intercooler water temperature only.

¹⁵ Unless otherwise specified, overload power is available for two hours in every 24 hour period at a level specified in the Notes section (above) or on a Special Application Approval.

¹⁶ For complete information regarding operation on propane and other fuels, including proper ignition timing, see the most current, model specific S-07079 series Technical Data Sheets.

¹⁷ Temperature is defined as the engine combustion air inlet temperature.

¹⁸ Gas compression application only. Applies to 160 BMEP rating.

*For Peak Shaving derates, contact the Waukesha Sales Engineering Department.

Waukesha L7042GL Emission Calculations

South Ignacio Central Delivery Point

Red Cedar Gathering Company

Waukesha L7042 GL - Internal Combustion Engine (4SLB)

Units E2 - E4

Manufacturer Unit Rating:	1,480	hp @ 1,200 rpm
Site Specific Unit Rating ^a :	1,337	hp @ 6,320 ft
BSFC:	7,284	btu/hp-hr
Maximum Heat Input:	9.7	MMBtu/hr
Operating Schedule:	8,760	hr/yr
Maximum Fuel Use ^b :	94.4	mmscf/yr

^a Based on manufacturer's site derate of 2% for every 1,000 ft above 1,500 ft elevation.

^b Based on LHV of: 900 btu/scf

Potential Criteria Pollutant Emissions

Pollutant	Uncontrolled Emissions			
	Emission Factors	Data Source	(lb/hr)	(ton/yr)
NO _x	1.50 g/hp-hr	Engine Manufacturer	4.42	19.37
CO	2.70 g/hp-hr	Engine Manufacturer	7.96	34.86
VOC	1.00 g/hp-hr	Engine Manufacturer	2.95	12.91
PM ₁₀	9.99E-03 lb/MMBtu	AP-42; Table 3.2-2	0.10	0.42
SO ₂	5.88E-04 lb/MMBtu	AP-42; Table 3.2-2	0.01	0.02
CO ₂	110.00 lb/MMBtu	AP-42; Table 3.2-2	1,067.00	4,673.46
Methane	1.25 lb/MMBtu	AP-42; Table 3.2-2	12.13	53.11
CO ₂ e	--	--	--	5,444.15 MT/yr

Hazardous Air Pollutant (HAP) Emissions

Pollutant	Emission Factors ^c	Data Source	Uncontrolled Emissions	
			(lb/hr)	(ton/yr)
1,3-Butadiene	2.67E-04 lb/MMBtu	AP-42; Table 3.2-2	2.59E-03	1.13E-02
2,2,4-Trimethylpentane	2.50E-04 lb/MMBtu	AP-42; Table 3.2-2	2.43E-03	1.06E-02
Acetaldehyde	8.36E-03 lb/MMBtu	AP-42; Table 3.2-2	8.11E-02	0.36
Acrolein	5.14E-03 lb/MMBtu	AP-42; Table 3.2-2	4.99E-02	0.22
Benzene	4.40E-04 lb/MMBtu	AP-42; Table 3.2-2	4.27E-03	1.87E-02
Biphenyl	2.12E-04 lb/MMBtu	AP-42; Table 3.2-2	2.06E-03	9.01E-03
Formaldehyde	5.28E-02 lb/MMBtu	AP-42; Table 3.2-2	5.12E-01	2.24
Methanol	2.50E-03 lb/MMBtu	AP-42; Table 3.2-2	2.43E-02	0.11
n-Hexane	1.11E-03 lb/MMBtu	AP-42; Table 3.2-2	1.08E-02	4.72E-02
Toluene	4.08E-04 lb/MMBtu	AP-42; Table 3.2-2	3.96E-03	1.73E-02
Xylene	1.84E-04 lb/MMBtu	AP-42; Table 3.2-2	1.78E-03	7.82E-03
Total	--		< 0.70	< 3.05

^c Uncontrolled emission factors for 4-stroke, lean-burn (4SLB) engines based on the highest emission factor between EPA's AP-42, GRI field data and GRI literature data sets, and the manufacturer's data.

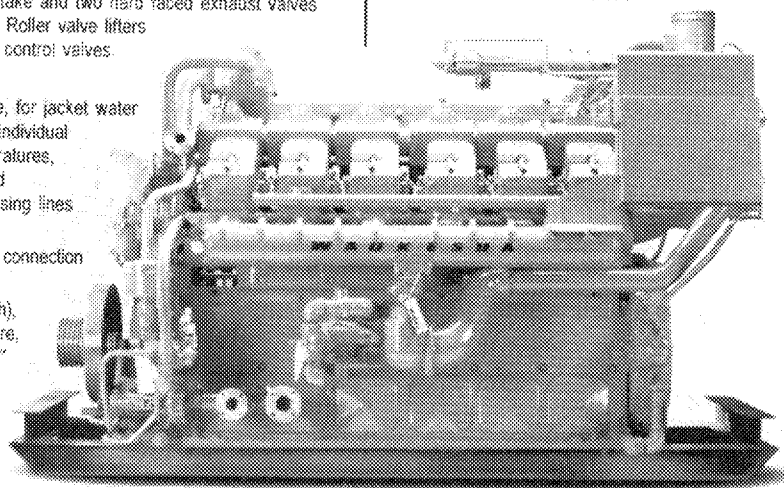
STANDARD EQUIPMENT

- AIR CLEANER** – Two, dry type with rain shield and service indicator.
- BARRING DEVICE** – Manual.
- BEARINGS** – Heavy duty, replaceable, precision type.
- BREATHER** – Closed system.
- CONNECTING RODS** – Drop forged steel, rifle drilled.
- CONTROL SYSTEM** – Pneumatic. Includes pilot operated valves for air start and prelube. Engine mounted control panel with two push button valves. Pilot operated air start valves omitted when starter is not furnished by Waukesha. Includes engine On/Off push button. One mounted on either side of the engine.
- CRANKCASE** – Integral crankcase and cylinder frame. Main bearing caps drilled and tapped for temperature sensors. Does not include sensors.
- CRANKSHAFT** – Counterweighted, forged steel, seven main bearings, and dynamically balanced.
- CYLINDERS** – Removable wet type cylinder liners, chrome plated on outer diameter. Induction hardened.
- CYLINDER HEADS** – Twelve interchangeable. Two hard faced intake and two hard faced exhaust valves per cylinder. Hard faced intake and exhaust valve seat inserts. Roller valve lifters and hydraulic push rods. Includes prechamber and related fuel control valves.
- ENGINE ROTATION** – Counterclockwise when facing flywheel.
- ENGINE MONITORING DEVICES** – Engine thermocouples, K-type, for jacket water temperature, lube oil temperature, intake manifold temperature, individual cylinder exhaust temperature and a common pre turbine temperatures, one on each bank. Magnetic pickup wired for customer supplied tachometer. Lube oil pressure and intake manifold pressure sensing lines are terminated in a common bulk head.
- EXHAUST OUTLET** – Single vertical at rear. Flexible stainless steel connection with 8" (203 mm) pipe flange.
- FLYWHEEL** – Approx. $WR^2 = 155000 \text{ lb-in}^2$; with ring gear (208 teeth), machined to accept two drive adapters: 31.88" (810 mm) pilot bore, 30.25" (768 mm) bolt circle, (12) 0.75"-10 tapped holes; or 28.88" (734 mm) pilot bore, 27.25" (692 mm) bolt circle, (12) 0.625"-11 tapped holes and (12) 0.75"-10 tapped holes.
- FLYWHEEL HOUSING** – No. 00 SAE.
- FUEL SYSTEM** – Dual natural gas, 4" (102 mm) duplex updraft carburetors. Two Fisher Model 99, 2" (51 mm) gas regulators, 30 – 50 psi (241 – 345 kPa) gas inlet pressure required. Prechamber fuel system and control logic.
- GOVERNOR** – Woodward UG-8 LD hydraulic lever type, with friction type speed control. Mounted on right hand side.
- IGNITION** – Waukesha Custom Engine Control Ignition Module. Electronic digital ignition system. 24V DC power required.
- INTERCOOLER** – Air-to-water.
- LEVELING BOLTS**
- LIFTING EYES**
- LUBRICATION** – Full pressure. Gear type pump. Full flow filter, 36 gallon (136 litres) capacity, not mounted. Includes flexible connections. Includes lube oil strainer, mounted on engine. Air/gas motor driven prelube pump. Requires final piping.
- MANIFOLDS** – Exhaust, (2) water cooled.
- OIL COOLER** – With thermostatic temperature controller and pressure regulating valve. Not mounted.
- OIL PAN** – Base type. 90 gallon (340 litres) capacity including filter and cooler.
- PAINT** – Oxfeld orange primer.
- PISTONS** – Aluminum with floating pin. 10.5:1 compression ratio. Oil cooled.
- SHIPPING SKID** – Steel for domestic truck or rail.
- TURBOCHARGERS** – Two, dry type. Wastegate controlled.
- VIBRATION DAMPER** – Two, viscous type. Guard included with remote mounted radiator or no radiator.
- WATER CIRCULATING SYSTEM**
- Auxiliary Circuit** – For oil cooler and intercooler. Pump is belt driven from crankshaft pulley. Includes thermostatic valve.
- Engine Jacket** – Belt driven water circulating pump, cluster type thermostatic temperature regulating valve, full flow bypass type. Flange connections and mating flanges for (2) 4" (102 mm) inlets and (1) 5" (127 mm) outlet.
- WAUKESHA CUSTOM ENGINE CONTROL, DETONATION SENSING MODULE (DSM)** – Includes individual cylinder sensors. Detonation Sensing Module, filter and cables. Device is compatible with Waukesha CEC Ignition Module only. Sensors are mounted and wired to engine junction box. Detonation Sensing Module and filter are shipped loose. One 11 ft. cable provided for connection between engine junction box and filter. One each 15 ft. cable provided for connection between filter and DSM and Ignition Module and DSM. One 20 ft. cable provided for power and ground for filter. All cables are shipped loose. Packager is responsible for power supply and ground to the DSM. 24V DC power is required. The DSM meets Canadian Standards Association Class 1, Group D. Division 2, hazardous location requirements.

Waukesha
VHP

L7042GL

VHP™ Series Gas Engine
886 - 1547 BHP



Model L7042GL Turbocharged and Intercooled, Twelve Cylinder, Lean Combustion, Four-Cycle Gas Engine

SPECIFICATIONS

Cylinders	Starting System
V 12	125 - 150 psi air/gas
Piston Displacement	24/32V electric
7040 cu. in. (115 L)	Dry Weight
Bore & Stroke	21,000 lb. (9525 kg)
9.375" x 8.5" (238 x 216 mm)	Full Load Exhaust Emissions
Compression Ratio	Nox - 1.50 g/bhp-hr
10.5:1	CO - 2.60 g/bhp-hr
Jacket Water	HC - 1.00 g/bhp-hr (240-260 ppm)
System Capacity	
107 gal. (405 L)	
Lube Oil Capacity	
90 gal. (340 L)	

ISO 9001
CERTIFIED

POWER RATINGS: L7042GL VHP SERIES GAS ENGINES

Model	I.C. Water Inlet Temp. °F (°C) (Tera)	C.R.	Brake Horsepower (kWb Output)				
			800 rpm	900 rpm	1000 rpm	1100 rpm	1200 rpm
High Speed Turbo ¹	85° (29°)	10.5:1	928 (692)	1160 (865)	1289 (961)	1418 (1057)	1547 (1154)
High Speed Turbo ¹	130° (54°)	10.5:1	886 (661)	1108 (826)	1232 (919)	1355 (1010)	1478 (1102)
Low Speed Turbo ²	85° (29°)	10.5:1	1031 (769)	1160 (865)	1289 (961)	---	---
Low Speed Turbo ²	130° (54°)	10.5:1	985 (735)	1108 (826)	1232 (919)	---	---

¹High speed turbocharger match -- 1001-1200 rpm

²Low speed turbocharger match -- 700-1000 rpm

Rating Standard: All models: Ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and auxiliary water temperature Tera (clause 10.1) as specified above limited to $\pm 10^\circ \text{F}$ ($\pm 5^\circ \text{C}$). Ratings are also valid for SAE J1349, BS5514, DIN6271 and AP17B-11C standard atmospheric conditions.

ISO Standard Power/Continuous Power Rating: The highest load and speed which can be applied 24 hours a day, seven days a week, 365 days per year except for normal maintenance. It is permissible to operate the engine at up to 10% overload, or maximum load indicated by the intermittent rating, whichever is lower, for two hours in each 24 hour period.

All natural gas engine ratings are based on a fuel of 900 Btu/ft³ (35.3 MJ/m³) SLHV value, with a 91 Waukesha Knock Index[®].

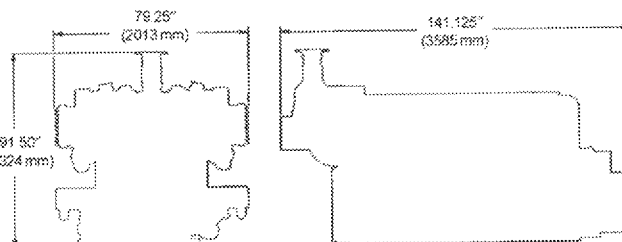
For conditions or fuels other than standard, the Waukesha Engine Sales Engineering Department.

PERFORMANCE: L7042GL VHP SERIES GAS ENGINES

English		130° F ICW		85° F ICW		Metric	54° C ICW		29° C ICW	
Low NO _x Settings	RPM	1200	1000	1200	1000		1200	1000	1200	1000
	Power (Bhp)	1478	1232	1547	1289	Power (kWb)	1103	919	1154	962
	BSFC (Btu/bhp-hr)	7155	6815	7180	6840	BSFC (kJ/kW-hr)	10124	9643	10160	9679
	NO _x (grams/bhp-hr)	0.90	0.90	0.70	0.70	NO _x (g/nm ³)	0.37	0.37	0.29	0.29
	CO (grams/bhp-hr)	2.75	2.65	2.65	2.55	CO (g/nm ³)	1.14	1.10	1.10	1.05
	NMHC (grams/bhp-hr)	1.00	1.00	1.10	1.10	NMHC (g/nm ³)	0.41	0.41	0.45	0.45
Low Fuel Consumption Settings	BSFC (Btu/bhp-hr)	6910	6615	6935	6640	BSFC (kJ/kW-hr)	9778	9360	9813	9396
	NO _x (grams/bhp-hr)	1.50	1.60	1.30	1.40	NO _x (g/nm ³)	0.62	0.66	0.54	0.58
	CO (grams/bhp-hr)	3.00	2.75	2.90	2.65	CO (g/nm ³)	1.24	1.14	1.20	1.10
	NMHC (grams/bhp-hr)	0.70	1.00	0.80	1.10	NMHC (g/nm ³)	0.29	0.41	0.33	0.45

NOTES:

- Performance ratings are based on ISO 3046/1-1995 with mechanical efficiency of 90% and Tera limited to $\pm 10^\circ \text{F}$.
- Fuel consumptions based on ISO 3046/1-1995 with a +5% tolerance for commercial quality natural gas having a 900 Btu/ft³ saturated low heat value.
- Data based on standard conditions of 77° F (25° C) ambient temperature, 29.53 inches Hg (100kPa) barometric pressure, 30% relative humidity (0.3 inches Hg / 1 kPa water vapor pressure).
- Data will vary due to variations in site conditions. For conditions and/or fuels other than standard, consult the Waukesha Engine Sales Engineering Department.



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Bulletin 7005 0102

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Waukesha L5794LT Emission Calculations

South Ignacio Central Delivery Point

Red Cedar Gathering Company

Waukesha L5794LT - Internal Combustion Engine (4SLB)

Units E5 - E8

Manufacturer Unit Rating:	1,447	hp @ 1,200 rpm
Site Specific Unit Rating ^a :	1,401	hp @ 6,320 ft
BSFC:	7,600	btu/hp-hr
Maximum Heat Input:	10.6	MMBtu/hr
Operating Schedule:	8,760	hr/yr
Maximum Fuel Use ^b :	103.6	mmscf/yr

^a Based on manufacturer's site derate of 2.4% for every 1,000 ft above 5,000 ft elevation.

^b Based on LHV of: 900 btu/scf

Potential Criteria Pollutant Emissions

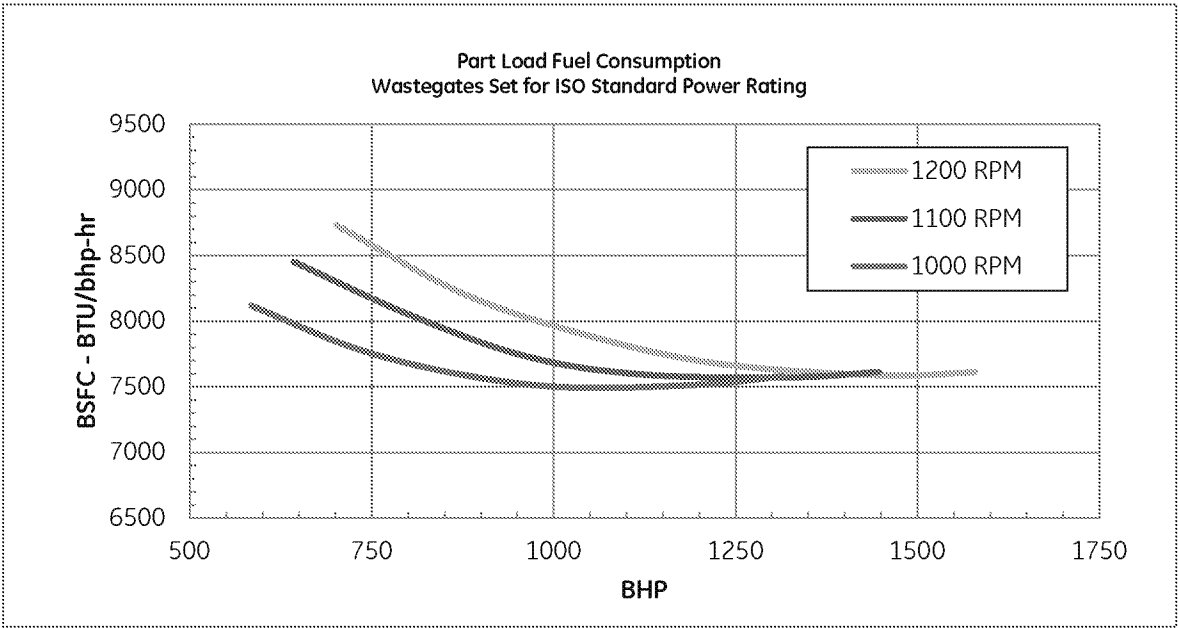
Pollutant	Uncontrolled Emissions			
	Emission Factors	Data Source	(lb/hr)	(ton/yr)
NO _x	2.08 g/hp-hr	Engine Manufacturer	6.42	28.14
CO	1.84 g/hp-hr	Engine Manufacturer	5.68	24.89
VOC	1.00 g/hp-hr	Engine Manufacturer	3.09	13.53
PM ₁₀	9.99E-03 lb/MMBtu	AP-42; Table 3.2-2	0.11	0.47
SO ₂	5.88E-04 lb/MMBtu	AP-42; Table 3.2-2	0.01	0.03
CO ₂	110.00 lb/MMBtu	AP-42; Table 3.2-2	1,171.24	5,130.01
Methane	1.25 lb/MMBtu	AP-42; Table 3.2-2	13.31	58.30
CO ₂ e	--	--	--	5,975.99 MT/yr

Hazardous Air Pollutant (HAP) Emissions

Pollutant	Emission Factors ^c	Data Source	Uncontrolled Emissions	
			(lb/hr)	(ton/yr)
1,3-Butadiene	2.67E-04 lb/MMBtu	AP-42; Table 3.2-2	2.84E-03	1.25E-02
2,2,4-Trimethylpentane	2.50E-04 lb/MMBtu	AP-42; Table 3.2-2	2.66E-03	1.17E-02
Acetaldehyde	8.36E-03 lb/MMBtu	AP-42; Table 3.2-2	8.90E-02	0.39
Acrolein	5.14E-03 lb/MMBtu	AP-42; Table 3.2-2	5.47E-02	0.24
Benzene	4.40E-04 lb/MMBtu	AP-42; Table 3.2-2	4.68E-03	2.05E-02
Biphenyl	2.12E-04 lb/MMBtu	AP-42; Table 3.2-2	2.26E-03	9.89E-03
Formaldehyde	5.28E-02 lb/MMBtu	AP-42; Table 3.2-2	5.62E-01	2.46
Methanol	2.50E-03 lb/MMBtu	AP-42; Table 3.2-2	2.66E-02	0.12
n-Hexane	1.11E-03 lb/MMBtu	AP-42; Table 3.2-2	1.18E-02	5.18E-02
Toluene	4.08E-04 lb/MMBtu	AP-42; Table 3.2-2	4.34E-03	1.90E-02
Xylene	1.84E-04 lb/MMBtu	AP-42; Table 3.2-2	1.96E-03	8.58E-03
Total	--		< 0.76	< 3.34

^c Uncontrolled emission factors for 4-stroke, lean-burn (4SLB) engines based on the highest emission factor between EPA's AP-42, GRI field data and GRI literature data sets, and the manufacturer's data.

Engine Ratings and Fuel Consumption **ISO Standard (Continuous) Ratings for Model L5794LT with ESM*** **130°F (54°C) Auxiliary Water Temperature**



RPM	800	900	1000	1000 ^a	1100	1200
CONTINUOUS BHP	614	954	1206	1272	1326	1447
OVERLOAD BHP	None	None	1315	None	1447	1579

OVERLOAD	Allowed 2 Hours per 24 Hours	
STANDARD CONDITIONS	Barometer 29.54 in. Hg. (100 kPa)	Ambient Temperature 77°F (25°C)
DEDUCTIONS	Altitude: 2.4% per 1000 ft. (305 m) above 5000 ft. (1524 m) Ambient Temperature: 2.4% per 10°F (5.5°C) above 100°F (38°C)	
FUEL	Dry Natural Gas – 900 Btu/ft ³ (35.38 MJ/m ³) SLHV; 91 WKI* Refer to S-7884-7 for Full Fuel Specification	
EQUIPMENT	Engine Equipped with Lube Oil and Cooling Water Pumps but without Radiator Fan	
ENGINE DATA	Turbocharged & Intercooled with 130°F (54°C) Intercooler Water 10.2:1 Compression Ratio	

NOTES:

- ISO Standard (continuous) power ratings conform to ISO 3046/1, latest version, with a mechanical efficiency of 90% and auxiliary water temperature, T_{cra}, of 130°F (54°C) limited to ± 10°F (± 5.5°C).
- Reference Heat Rejection and Operating Data Standard Sheet S-6124-79.
- Engine set to an exhaust oxygen concentration of 7.8% at ESM ignition timing for 2.25 g/bhp-hr NO_x (0.91 g/nm³ @ 5% O₂).
- Power generation continuous BHP at 1000 RPM is 1272 BHP @ 7.4% O₂ with no overload allowed.

*Trademark of General Electric Company. All other trademarks are the property of their respective owners.



Engine Ratings & Fuel Consumption Model L5794LT with ESM 130°F (54°C) Auxiliary Water Temperature 180°F (82°C) Jacket Water Temperature	EN: 155598 DATE: 5/13	Ref. C 977-5
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HEAT REJECTION AND OPERATING DATA — MODEL L5794LT with ESM*
ESM SPARK TIMING for 2.25 g/bhp-hr NO_x (0.91 g/nm³ @ 5% O₂),
10.2:1 CR, 7.8% EXHAUST O₂
130°F AUXILIARY WATER TEMP. — 180°F JACKET WATER TEMP.

	BMEP (PSI)	ENGINE SPEED – RPM		
		1000	1100	1200
POWER (BHP)	180	1315	1447	1579
	165	1206	1326	1447
	140	1023	1125	1228
	120	877	965	1052
	100	731	804	877
	80	585	643	702
BRAKE SPEC FUEL CONS. (BTU/BHP-HR)	180	7448	7478	7476
	165	7386	7439	7454
	140	7363	7459	7540
	120	7456	7593	7745
	100	7651	7903	8062
	80	7975	8304	8577
FUEL CONS. (BTU/HR x 1000)	180	9797	10821	11801
	165	8906	9867	10786
	140	7533	8395	9258
	120	6538	7325	8150
	100	5591	6353	7070
	80	4662	5340	6018
HEAT TO JACKET WATER (BTU/HR x 1000)	180	2564	2805	3017
	165	2274	2511	2721
	140	1860	2092	2316
	120	1590	1818	2056
	100	1356	1601	1822
	80	1148	1383	1617
HEAT TO LUBE OIL (BTU/HR x 1000)	180	413	464	512
	165	387	438	485
	140	349	400	448
	120	325	376	425
	100	306	358	408
	80	294	347	400

	BMEP (PSI)	ENGINE SPEED – RPM		
		1000	1100	1200
HEAT TO INTERCOOLER (BTU/HR x 1000)	180	341	429	514
	165	315	389	461
	140	275	329	386
	120	245	286	333
	100	213	247	277
	80	173	195	216
HEAT TO RADIATION (BTU/HR x 1000)	180	441	452	459
	165	419	431	440
	140	387	402	414
	120	366	382	399
	100	347	369	386
	80	329	353	374
TOTAL ENERGY IN EXHAUST (BTU/HR x 1000)	180	2864	3181	3491
	165	2600	2897	3187
	140	2192	2457	2733
	120	1896	2137	2403
	100	1607	1844	2070
	80	1313	1520	1733
EXHAUST TEMP AFTER TURBINE (± 50°F)	180	880	886	893
	165	875	882	889
	140	866	874	883
	120	858	866	878
	100	845	857	867
	80	821	835	848
INDUCTION AIR FLOW (SCFM)	180	2787	3079	3357
	165	2534	2807	3069
	140	2143	2388	2634
	120	1860	2084	2319
	100	1591	1807	2011
	80	1326	1519	1712

Continued



HEAT REJECTION AND OPERATING DATA — MODEL L5794LT with ESM*
ESM SPARK TIMING for 2.25 g/bhp-hr NO_x (0.91 g/nm³ @ 5% O₂),
10.2:1 CR, 7.8% EXHAUST O₂
130°F AUXILIARY WATER TEMP. — 180°F JACKET WATER TEMP.

	BMEP (PSI)	ENGINE SPEED – RPM		
		1000	1100	1200
EXHAUST GAS FLOW (LBS/HR)	180	12517	13825	15077
	165	11378	12606	13780
	140	9624	10725	11827
	120	8353	9357	10412
	100	7143	8117	9033
	80	5956	6822	7688
NO _x EMISSION (G/BHP-HR)	180	2.06	2.06	2.07
	165	2.08	2.08	2.08
	140	2.11	2.11	2.04
	120	2.13	2.13	2.00
	100	2.28	2.14	2.07
	80	2.70	2.46	2.23
CO EMISSION (G/BHP-HR)	180	1.61	1.69	1.77
	165	1.68	1.76	1.84
	140	1.82	1.90	1.96
	120	1.95	2.03	2.07
	100	2.15	2.19	2.24
	80	2.50	2.52	2.53

	BMEP (PSI)	ENGINE SPEED – RPM		
		1000	1100	1200
NMHC EMISSION (G/BHP-HR)	180	0.18	0.17	0.16
	165	0.19	0.18	0.17
	140	0.22	0.21	0.20
	120	0.25	0.24	0.23
	100	0.28	0.27	0.26
	80	0.33	0.32	0.31
THC EMISSION (G/BHP-HR)	180	2.41	2.25	2.10
	165	2.59	2.44	2.29
	140	2.97	2.82	2.66
	120	3.35	3.20	3.04
	100	3.84	3.68	3.52
	80	4.50	4.34	4.18

NOTES:

1. All data are based on ISO standard conditions of 29.54 inches Hg. barometric pressure, 77°F ambient and induction air temperature, 30% relative humidity (0.3 inches Hg. water vapor pressure), 182°F engine jacket water outlet temperature, and ignition timing as provided by the Engine System Manager (ESM).
2. All data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions and with changes to ignition timing or air/fuel ratio. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines, S-6699-7, latest version.
3. ISO Standard (continuous) power ratings conform to ISO 3046/1, latest version, with a mechanical efficiency of 90% and auxiliary water temperature, T_{cr}, of 130°F limited to ± 10°F.
4. Fuel standard: dry natural gas, 900 BTU/scf saturated lower heating value (SLHV), with a minimum Waukesha Knock Index* of 91. Refer to S-7884-7, latest version, for the full fuel specification.
5. 10.2:1 compression ratio.
6. For heat rejection changes due to engine jacket water outlet temperature higher than standard (Note 1), refer to S-7613-3, latest version.
7. Total Exhaust Energy includes both recoverable and non-recoverable heat. For a procedure to calculate recoverable heat refer to S-8117-2, latest version.
8. Exhaust oxygen (O₂) concentration set to 7.8% at ESM spark timing for 2.25 g/bhp-hr NO_x (0.91 g/nm³ @ 5% O₂). This O₂ level is measured at the port located in the exhaust manifold upstream of the turbocharger.
9. Reference Engine Ratings and Fuel Consumption Curve Sheet C-977-5, latest version.
10. Exhaust flow at nominal 29.54 inches Hg. atmospheric pressure:

$$\text{Flow rate: ACFM} = \frac{(\text{Exh. Flow, lb/hr}) \times (\text{Exh. Temp. } ^\circ\text{F} + 460^\circ)}{2250}$$



HEAT REJECTION AND OPERATING DATA MODEL – L5794LT with ESM 130°F AUX. WATER TEMPERATURE 180°F JACKET WATER TEMPERATURE	EN: 128025 DATE: 7/03	Ref. S 6124-79
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— METRIC —

HEAT REJECTION AND OPERATING DATA — MODEL L5794LT with ESM*

ESM SPARK TIMING for 0.91 g/nm³ @ 5% O₂ (2.25 g/bhp-hr),

10.2:1 CR, 7.8% EXHAUST O₂

54°C AUXILIARY WATER TEMP. — 82°C JACKET WATER TEMP.

	BMEP (bar)	ENGINE SPEED – RPM		
		1000	1100	1200
POWER (KW)	12.42	981	1079	1177
	11.39	899	989	1079
	9.66	763	839	916
	8.28	654	719	785
	6.9	545	599	654
	5.52	436	480	523
BRAKE SPEC FUEL CONS. (KJ/KWH)	12.42	10537	10580	10577
	11.39	10449	10525	10546
	9.66	10417	10553	10668
	8.28	10548	10742	10957
	6.9	10824	11182	11407
	5.52	11283	11748	12135
FUEL CONS. (KW)	12.42	2872	3172	3459
	11.39	2610	2892	3161
	9.66	2208	2460	2713
	8.28	1916	2147	2389
	6.9	1639	1862	2072
	5.52	1367	1565	1764
HEAT TO JACKET WATER (KW)	12.42	751	822	884
	11.39	666	736	798
	9.66	545	613	679
	8.28	466	533	603
	6.9	398	469	534
	5.52	337	405	474
HEAT TO LUBE OIL (KW)	12.42	121	136	150
	11.39	113	128	142
	9.66	102	117	131
	8.28	95	110	125
	6.9	90	105	120
	5.52	86	102	117

	BMEP (bar)	ENGINE SPEED – RPM		
		1000	1100	1200
HEAT TO INTERCOOLER (KW)	12.42	100	126	151
	11.39	92	114	135
	9.66	80	96	113
	8.28	72	84	97
	6.9	63	73	81
	5.52	51	57	63
HEAT TO RADIATION (KW)	12.42	129	132	135
	11.39	123	126	129
	9.66	113	118	121
	8.28	107	112	117
	6.9	102	108	113
	5.52	97	103	110
TOTAL ENERGY IN EXHAUST (KW)	12.42	840	932	1023
	11.39	762	849	934
	9.66	642	720	801
	8.28	556	626	704
	6.9	471	541	607
	5.52	385	445	508
EXHAUST TEMP AFTER TURBINE (± 30°C)	12.42	471	475	478
	11.39	468	472	476
	9.66	464	468	473
	8.28	459	463	470
	6.9	452	458	464
	5.52	438	446	453
INDUCTION AIR FLOW (NM ³ /HR)	12.42	4284	4732	5160
	11.39	3894	4315	4716
	9.66	3294	3671	4048
	8.28	2859	3203	3564
	6.9	2445	2778	3092
	5.52	2039	2335	2631

Continued



<p>— Metric — HEAT REJECTION AND OPERATING DATA MODEL – L5794LT with ESM 54°C AUX. WATER TEMPERATURE 82°C JACKET WATER TEMPERATURE</p>		<p>EN: 128025 DATE: 7/03</p>	<p>Ref. S 6124-79</p>
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— METRIC —

HEAT REJECTION AND OPERATING DATA — MODEL L5794LT with ESM*
ESM SPARK TIMING for 0.91 g/nm³ @ 5% O₂ (2.25 g/bhp-hr),
10.2:1 CR, 7.8% EXHAUST O₂
54°C AUXILIARY WATER TEMP. — 82°C JACKET WATER TEMP.

	BMEP (bar)	ENGINE SPEED – RPM		
		1000	1100	1200
EXHAUST GAS FLOW (KG/HR)	12.42	5678	6271	6839
	11.39	5161	5718	6251
	9.66	4366	4865	5365
	8.28	3789	4245	4723
	6.9	3240	3682	4097
	5.52	2702	3095	3487
NO _x EMISSION (G/NM ³ AT 5% O ₂)	12.42	0.83	0.83	0.83
	11.39	0.84	0.84	0.84
	9.66	0.85	0.85	0.82
	8.28	0.86	0.86	0.81
	6.9	0.92	0.86	0.83
	5.52	1.09	0.99	0.90
CO EMISSION (G/NM ³ AT 5% O ₂)	12.42	0.65	0.68	0.71
	11.39	0.68	0.71	0.74
	9.66	0.73	0.77	0.79
	8.28	0.79	0.82	0.83
	6.9	0.87	0.88	0.90
	5.52	1.01	1.01	1.02

	BMEP (bar)	ENGINE SPEED – RPM		
		1000	1100	1200
NMHC EMISSION (G/NM ³ AT 5% O ₂)	12.42	0.07	0.07	0.06
	11.39	0.08	0.07	0.07
	9.66	0.09	0.08	0.08
	8.28	0.10	0.10	0.09
	6.9	0.11	0.11	0.11
	5.52	0.13	0.13	0.12
THC EMISSION (G/NM ³ AT 5% O ₂)	12.42	0.97	0.91	0.85
	11.39	1.04	0.98	0.92
	9.66	1.20	1.13	1.07
	8.28	1.35	1.29	1.22
	6.9	1.54	1.48	1.42
	5.52	1.81	1.75	1.68

NOTES:

- All data are based on ISO standard conditions of 100 kPa barometric pressure, 25°C ambient and induction air temperature, 30% relative humidity (1 kPa water vapor pressure), 82°C engine jacket water outlet temperature, and ignition timing as provided by the Engine System Manager (ESM).
- All data are average values at the standard conditions and will vary for individual engines and with operating and ambient conditions and with changes to ignition timing or air/fuel ratio. An adequate reserve should be used for cooling system or heat recovery calculations. See also Cooling System Guidelines, S-6699-7, latest version.
- ISO Standard (continuous) power ratings conform to ISO 3046/1, latest version, with a mechanical efficiency of 90% and auxiliary water temperature, T_{cr}, of 54°C limited to ± 5.5°C.
- Fuel standard: dry natural gas, 35.38 MJ/m³ [25, V (0; 101.325)] saturated lower heating value (SLHV), with a minimum Waukesha Knock Index* of 91. Refer to S-7884-7, latest version, for the full fuel specification.
- 10.2:1 compression ratio.
- For heat rejection changes due to engine jacket water outlet temperature higher than standard (Note 1), refer to S-7613-3, latest version.
- Total Exhaust Energy includes both recoverable and non-recoverable heat. For a procedure to calculate recoverable heat refer to S-8117-2, latest version.
- Exhaust oxygen (O₂) concentration set to 7.8% at ESM spark timing for 2.25 g/bhp-hr NO_x (0.91 g/nm³ @ 5% O₂). This O₂ level is measured at the port located in the exhaust manifold upstream of the turbocharger.
- Reference Engine Ratings and Fuel Consumption Curve Sheet C-977-5, latest version.
- Exhaust flow at nominal 100 kPa atmospheric pressure:

$$\text{Flow rate: m}^3/\text{hr} = \frac{(\text{Exh. Flow, kg/hr}) \times (\text{Exh. Temp. } ^\circ\text{C} + 273^\circ)}{332.96}$$

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<p>— Metric — HEAT REJECTION AND OPERATING DATA MODEL – L5794LT with ESM 54°C AUX. WATER TEMPERATURE 82°C JACKET WATER TEMPERATURE</p>		<p>EN: 128025 DATE: 7/03</p>	<p>Ref. S 6124-79</p>
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Analysis Certificate

Analysis Requested:

GPA 2286_14

Client:	Red Cedar	Project #:	95031-0055
Site Name:	South Ignacio	Compensations:	Air & Helium Free
Laboratory ID:	P904129-01	Date Reported:	05/10/19
Sampled by:	K Hunderman	Date Sampled:	04/24/19
Analyzed by:	I Yazzie / E Montoya	Date Received:	04/26/19
Sample Pressure:	409.7 psig	Date Analyzed:	05/09/19
Sample Temperature:	67.56 F	Analysis Time:	Std

GPA 2286_14 report

Components	Mol %	Wt %	L.V. %
Helium	BRL	BRL	BRL
Oxygen	BRL	BRL	BRL
Nitrogen	BRL	BRL	BRL
Carbon Dioxide	4.6651	11.7986	4.6640
Methane	95.0269	87.6072	94.8640
Ethane	0.2657	0.4592	0.4130
Propane	0.0249	0.0632	0.0590
Iso-Butane	0.0054	0.0178	BRL
N-Butane	0.0051	0.0172	BRL
Iso-Pentane	0.0012	0.0052	BRL
N-Pentane	0.0003	0.0011	BRL
iso-Hexanes	0.0019	0.0095	BRL
Benzene	0.0001	0.0005	BRL
n-Hexane	BRL	BRL	BRL
iso-Heptanes	0.0027	0.0156	BRL
Toluene	BRL	BRL	BRL
n-Heptane	BRL	BRL	BRL
iso-Octanes	0.0004	0.0026	BRL
n-Octane	BRL	BRL	BRL
n-Nonane	BRL	BRL	BRL
iso-Decanes	0.0001	0.0008	BRL
n-Decane	BRL	BRL	BRL
Totals	100.0000	100.0000	100.0000

BRL = Value below the method reportable limit = 0.0001%

N/R = Parameter not recorded

Analysis Certificate

Analysis Requested:

GPA 2286_14

Client:	Red Cedar	Project #:	95031-0055
Site Name:	South Ignacio	Compensations:	Air & Helium Free
Laboratory ID:	P904129-01	Date Reported:	05/10/19
Sampled by:	K Hunderman	Date Sampled:	04/24/19
Analyzed by:	I Yazzie / E Montoya	Date Received:	04/26/19
Sample Pressure:	409.7 psig	Date Analyzed:	05/09/19
Sample Temperature:	67.56 F	Analysis Time:	Std

GPA 2261_13 Report

Components	Mol %	Wt %	L.V. %
Carbon Dioxide	4.6651	11.7986	4.6640
Hydrogen Sulfide	BRL	BRL	BRL
Nitrogen	BRL	BRL	BRL
Methane	95.0269	87.6072	94.8640
Ethane	0.2657	0.4592	0.4130
Propane	0.0249	0.0632	0.0590
Iso-Butane	0.0054	0.0178	BRL
N-Butane	0.0051	0.0172	BRL
Iso-Pentane	0.0012	0.0052	BRL
N-Pentane	0.0003	0.0011	BRL
C6+	0.0054	0.0305	BRL
Helium	BRL	BRL	BRL
Oxygen	BRL	BRL	BRL
Totals	100.0000	100.0000	100.0000

BRL = Value below the method reportable limit = 0.0001%

N/R = Parameter not recorded

Group Reports

Components	Mol %	Wt %	L.V. %
Hexanes	0.0020	0.0100	BRL
Heptanes	0.0027	0.0156	BRL
Octanes	0.0004	0.0026	BRL
Nonanes	0.0002	0.0015	BRL
Heaviers	0.0001	0.0008	BRL
Totals	0.0054	0.0305	0.0000

BRL = Value below the method reportable limit = 0.0001%

N/R = Parameter not recorded

Analysis Certificate

Analysis Requested:

GPA 2286_14

Client:	Red Cedar	Project #:	95031-0055
Site Name:	South Ignacio	Compensations:	Air & Helium Free
Laboratory ID:	P904129-01	Date Reported:	05/10/19
Sampled by:	K Hunderman	Date Sampled:	04/24/19
Analyzed by:	I Yazzie / E Montoya	Date Received:	04/26/19
Sample Pressure:	409.7 psig	Date Analyzed:	05/09/19
Sample Temperature:	67.56 F	Analysis Time:	Std

Glycal Report

Components	Mol %	Wt %	L.V. %
Carbon Dioxide	4.6651	11.7986	4.6640
Hydrogen Sulfide	BRL	BRL	BRL
Nitrogen	BRL	BRL	BRL
Methane	95.0269	87.6072	94.8640
Ethane	0.2657	0.4592	0.4130
Propane	0.0249	0.0632	0.0590
Iso-Butane	0.0054	0.0178	BRL
N-Butane	0.0051	0.0172	BRL
Iso-Pentane	0.0012	0.0052	BRL
N-Pentane	0.0003	0.0011	BRL
Cyclopentane	BRL	BRL	BRL
n-Hexane	BRL	BRL	BRL
Cyclohexane	BRL	BRL	BRL
Other Hexanes	0.0019	0.0095	BRL
n-Heptane	BRL	BRL	BRL
Methylcyclohexane	0.0005	0.0028	BRL
2,2,4 Trimethylpentane	BRL	BRL	BRL
Benzene	0.0001	0.0005	BRL
Toluene	BRL	BRL	BRL
EthylBenzene	BRL	BRL	BRL
Xylenes	BRL	BRL	BRL
Heaviers	0.0001	0.0008	BRL

BRL = Value below the method reportable limit = 0.0001%

N/R = Parameter not recorded

Analysis Certificate

Analysis Requested:

GPA 2286_14

Client:	Red Cedar	Project #:	95031-0055
Site Name:	South Ignacio	Compensations:	Air & Helium Free
Laboratory ID:	P904129-01	Date Reported:	05/10/19
Sampled by:	K Hunderman	Date Sampled:	04/24/19
Analyzed by:	I Yazzie / E Montoya	Date Received:	04/26/19
Sample Pressure:	409.7 psig	Date Analyzed:	05/09/19
Sample Temperature:	67.56 F	Analysis Time:	Std

GPA 2172_09 Report Calculations @ 14.696 psia and 60 degrees F

Compressibility Factor Dry Gas	0.9979	Compressibility Factor Sat Gas	0.9975
GPM C2+	0.084	GPM C3+	0.013
GPM C4+	0.006	GPM C5+	0.002
Ideal Dry Gas Relative Density:	0.601	Ideal Sat Gas Relative Density:	0.59
Real Dry Gas Relative Density:	0.602	Real Sat Gas Relative Density:	0.592
Dry Molecular Weight:	17.401	Sat Molecular Weight:	17.098
Gross HV per Ideal Dry ft3:	965.79	Gross HV per Ideal Sat ft3:	948.94
Gross HV per Real Dry ft3:	967.83	Gross HV per Real Sat ft3:	951.32

C6+ Calculations

Ideal C6+ Dry Relative Density	3.387	C6+ Dry Molecular Weight	98.1
C6+ Compressibility Factor	0.873	C6+ Gross HV per Ideal Dry ft3	5376.6

BRL = Value below the method reportable limit = 0.0001%

N/R = Parameter not recorded

Irene Zazzie

5/10/2019

Analyst

Date

I Yazzie / E Montoya

Printed

Comments: 03-21-19 revised per Khunderman.

Note: The above analyses are performed in compliance with GPA 2286_14 quality assurance procedures.

References: GPA 2286_14, TP-17, GPA Standard 2145-09 and GPA Standard 2172-09

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: South Ignacio - D1

File Name: \\durnetapp101\Shared\Durango Shared\EHS\Air Permits\T5 - South Ignacio\SOU Permits\200101 SOU_T5_Renewal App\Dehy\SOU_D1 PTE (no combustor).ddf

Date: November 01, 2019

DESCRIPTION:

Description: 30 MMscfd dehy unit; April '19 gas analysis,
gas temp, pressure and max glycol flow (Kim
50015); max gas flow (w/o combustor)

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.5321	12.771	2.3306
Ethane	0.0370	0.887	0.1619
Propane	0.0183	0.439	0.0801
Isobutane	0.0111	0.266	0.0486
n-Butane	0.0164	0.394	0.0718
Isopentane	0.0060	0.145	0.0264
n-Pentane	0.0022	0.052	0.0095
Other Hexanes	0.0259	0.621	0.1133
Methylcyclohexane	0.0735	1.765	0.3221
Benzene	0.0758	1.820	0.3322
C8+ Heavies	0.0352	0.845	0.1542
Total Emissions	0.8335	20.003	3.6506
Total Hydrocarbon Emissions	0.8335	20.003	3.6506
Total VOC Emissions	0.2644	6.346	1.1581
Total HAP Emissions	0.0758	1.820	0.3322
Total BTEX Emissions	0.0758	1.820	0.3322

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.3060	7.345	1.3404
Ethane	0.0053	0.128	0.0233
Propane	0.0012	0.028	0.0050
Isobutane	0.0004	0.010	0.0019
n-Butane	0.0005	0.011	0.0020
Isopentane	0.0001	0.003	0.0006
n-Pentane	<0.0001	0.001	0.0002
Other Hexanes	0.0003	0.008	0.0014
Methylcyclohexane	0.0001	0.003	0.0005
Benzene	<0.0001	<0.001	0.0001
C8+ Heavies	<0.0001	<0.001	0.0001
Total Emissions	0.3140	7.537	1.3755
Total Hydrocarbon Emissions	0.3140	7.537	1.3755

Total VOC Emissions	0.0027	0.064	0.0118
Total HAP Emissions	<0.0001	<0.001	0.0001
Total BTEX Emissions	<0.0001	<0.001	0.0001

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	6.1207	146.896	26.8086
Ethane	0.1064	2.554	0.4661
Propane	0.0230	0.553	0.1009
Isobutane	0.0085	0.204	0.0372
n-Butane	0.0093	0.222	0.0405
Isopentane	0.0028	0.067	0.0122
n-Pentane	0.0008	0.019	0.0034
Other Hexanes	0.0063	0.152	0.0278
Methylcyclohexane	0.0024	0.056	0.0103
Benzene	0.0004	0.010	0.0018
C8+ Heavies	0.0002	0.006	0.0011
Total Emissions	6.2808	150.738	27.5098
Total Hydrocarbon Emissions	6.2808	150.738	27.5098
Total VOC Emissions	0.0537	1.288	0.2351
Total HAP Emissions	0.0004	0.010	0.0018
Total BTEX Emissions	0.0004	0.010	0.0018

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.8381	20.115	3.6711
Ethane	0.0423	1.015	0.1852
Propane	0.0194	0.466	0.0851
Isobutane	0.0115	0.276	0.0504
n-Butane	0.0169	0.405	0.0738
Isopentane	0.0062	0.148	0.0270
n-Pentane	0.0022	0.053	0.0097
Other Hexanes	0.0262	0.628	0.1146
Methylcyclohexane	0.0736	1.768	0.3226
Benzene	0.0759	1.821	0.3323
C8+ Heavies	0.0352	0.845	0.1542
Total Emissions	1.1475	27.540	5.0261
Total Hydrocarbon Emissions	1.1475	27.540	5.0261
Total VOC Emissions	0.2671	6.410	1.1698
Total HAP Emissions	0.0759	1.821	0.3323
Total BTEX Emissions	0.0759	1.821	0.3323

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	29.1392	3.6711	87.40
Ethane	0.6280	0.1852	70.51
Propane	0.1809	0.0851	52.95

Isobutane	0.0857	0.0504	41.17
n-Butane	0.1123	0.0738	34.27
Isopentane	0.0386	0.0270	30.02
n-Pentane	0.0129	0.0097	25.05
Other Hexanes	0.1411	0.1146	18.73
Methylcyclohexane	0.3324	0.3226	2.94
Benzene	0.3340	0.3323	0.51
C8+ Heavies	0.1553	0.1542	0.66
<hr/>			
Total Emissions	31.1604	5.0261	83.87
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Total Hydrocarbon Emissions	31.1604	5.0261	83.87
Total VOC Emissions	1.3932	1.1698	16.03
Total HAP Emissions	0.3340	0.3323	0.51
Total BTEX Emissions	0.3340	0.3323	0.51

EQUIPMENT REPORTS:

ABSORBER

Specified Absorber Stages: 1.30
 Calculated Dry Gas Dew Point: 1.60 lbs. H2O/MMSCF
 Temperature: 67.6 deg. F
 Pressure: 409.7 psig
 Dry Gas Flow Rate: 30.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0279 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 42.73 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 9.68 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.73%	96.27%
Carbon Dioxide	99.75%	0.25%
Methane	99.99%	0.01%
Ethane	99.95%	0.05%
Propane	99.89%	0.11%
Isobutane	99.81%	0.19%
n-Butane	99.74%	0.26%
Isopentane	99.69%	0.31%
n-Pentane	99.59%	0.41%
Other Hexanes	99.40%	0.60%
Methylcyclohexane	95.31%	4.69%
Benzene	70.37%	29.63%
C8+ Heavies	93.68%	6.32%

FLASH TANK

Flash Control: Combustion device
 Flash Control Efficiency: 95.00 %
 Flash Temperature: 100.0 deg. F
 Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
-----------	-------------------	-------------------------

Water	99.99%	0.01%
Carbon Dioxide	56.18%	43.82%
Methane	8.00%	92.00%
Ethane	25.78%	74.22%
Propane	44.26%	55.74%
Isobutane	56.66%	43.34%
n-Butane	63.92%	36.08%
Isopentane	68.55%	31.45%
n-Pentane	73.76%	26.24%
Other Hexanes	80.49%	19.51%
Methylcyclohexane	97.03%	2.97%
Benzene	99.49%	0.51%
C8+ Heavies	99.39%	0.61%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	57.66%	42.34%
Carbon Dioxide	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.73%	99.27%
n-Pentane	0.68%	99.32%
Other Hexanes	1.24%	98.76%
Methylcyclohexane	4.12%	95.88%
Benzene	5.03%	94.97%
C8+ Heavies	12.10%	87.90%

STREAM REPORTS:

WET GAS STREAM

Temperature: 67.56 deg. F
Pressure: 424.40 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.00e-002	5.35e+001
Carbon Dioxide	4.66e+000	6.77e+003
Methane	9.49e+001	5.02e+004
Ethane	2.65e-001	2.63e+002
Propane	2.49e-002	3.62e+001
Isobutane	5.40e-003	1.03e+001
n-Butane	5.10e-003	9.77e+000
Isopentane	1.20e-003	2.85e+000
n-Pentane	3.00e-004	7.13e-001

Other Hexanes	1.90e-003	5.40e+000
Methylcyclohexane	5.00e-004	1.62e+000
Benzene	9.99e-005	2.57e-001
C8+ Heavies	9.99e-005	5.61e-001

Total Components	100.00	5.74e+004

DRY GAS STREAM

Temperature: 67.56 deg. F
 Pressure: 424.40 psia
 Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	3.37e-003	2.00e+000
Carbon Dioxide	4.65e+000	6.75e+003
Methane	9.50e+001	5.02e+004
Ethane	2.66e-001	2.63e+002
Propane	2.49e-002	3.61e+001
Isobutane	5.39e-003	1.03e+001
n-Butane	5.09e-003	9.74e+000
Isopentane	1.20e-003	2.84e+000
n-Pentane	2.99e-004	7.10e-001
Other Hexanes	1.89e-003	5.36e+000
Methylcyclohexane	4.77e-004	1.54e+000
Benzene	7.04e-005	1.81e-001
C8+ Heavies	9.37e-005	5.26e-001

Total Components	100.00	5.73e+004

LEAN GLYCOL STREAM

Temperature: 67.56 deg. F
 Flow Rate: 8.30e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.85e+001	4.60e+003
Water	1.50e+000	7.01e+001
Carbon Dioxide	3.55e-011	1.66e-009
Methane	4.78e-018	2.24e-016
Ethane	1.45e-009	6.77e-008
Propane	3.60e-011	1.68e-009
Isobutane	1.26e-011	5.87e-010
n-Butane	1.36e-011	6.36e-010
Isopentane	9.48e-007	4.43e-005
n-Pentane	3.18e-007	1.48e-005
Other Hexanes	6.96e-006	3.25e-004
Methylcyclohexane	6.77e-005	3.16e-003
Benzene	8.59e-005	4.01e-003
C8+ Heavies	1.04e-004	4.85e-003

Total Components	100.00	4.67e+003

RICH GLYCOL STREAM

Temperature: 67.56 deg. F
 Pressure: 424.40 psia
 Flow Rate: 8.45e+000 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.69e+001	4.60e+003
Water	2.56e+000	1.22e+002
Carbon Dioxide	3.50e-001	1.66e+001
Methane	1.40e-001	6.65e+000
Ethane	3.02e-003	1.43e-001
Propane	8.70e-004	4.13e-002
Isobutane	4.12e-004	1.96e-002
n-Butane	5.40e-004	2.56e-002
Isopentane	1.87e-004	8.86e-003
n-Pentane	6.25e-005	2.97e-003
Other Hexanes	6.85e-004	3.25e-002
Methylcyclohexane	1.66e-003	7.90e-002
Benzene	1.69e-003	8.03e-002
C8+ Heavies	8.49e-004	4.03e-002
-----	-----	-----
Total Components	100.00	4.75e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
 Pressure: 44.70 psia
 Flow Rate: 2.09e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
-----	-----	-----
Water	1.23e-001	1.22e-002
Carbon Dioxide	2.99e+001	7.28e+000
Methane	6.91e+001	6.12e+000
Ethane	6.41e-001	1.06e-001
Propane	9.46e-002	2.30e-002
Isobutane	2.64e-002	8.48e-003
n-Butane	2.88e-002	9.25e-003
Isopentane	6.99e-003	2.79e-003
n-Pentane	1.95e-003	7.79e-004
Other Hexanes	1.33e-002	6.35e-003
Methylcyclohexane	4.34e-003	2.35e-003
Benzene	9.54e-004	4.12e-004
C8+ Heavies	2.62e-004	2.47e-004
-----	-----	-----
Total Components	100.00	1.36e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
 Flow Rate: 8.42e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.72e+001	4.60e+003
Water	2.57e+000	1.22e+002
Carbon Dioxide	1.97e-001	9.33e+000
Methane	1.12e-002	5.32e-001

Ethane	7.81e-004	3.70e-002
Propane	3.86e-004	1.83e-002
Isobutane	2.34e-004	1.11e-002
n-Butane	3.46e-004	1.64e-002
Isopentane	1.28e-004	6.07e-003
n-Pentane	4.62e-005	2.19e-003
Other Hexanes	5.53e-004	2.62e-002
Methylcyclohexane	1.62e-003	7.67e-002
Benzene	1.69e-003	7.99e-002
C8+ Heavies	8.46e-004	4.01e-002

Total Components	100.00	4.73e+003

FLASH GAS EMISSIONS

Flow Rate: 4.92e+002 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)

Water	5.70e+001	1.33e+001
Carbon Dioxide	4.15e+001	2.37e+001
Methane	1.47e+000	3.06e-001
Ethane	1.36e-002	5.32e-003
Propane	2.01e-003	1.15e-003
Isobutane	5.62e-004	4.24e-004
n-Butane	6.14e-004	4.63e-004
Isopentane	1.49e-004	1.39e-004
n-Pentane	4.16e-005	3.89e-005
Other Hexanes	2.84e-004	3.17e-004
Methylcyclohexane	9.22e-005	1.18e-004
Benzene	2.03e-005	2.06e-005
C8+ Heavies	5.58e-006	1.23e-005

Total Components	100.00	3.73e+001

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.18e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	9.20e+001	5.15e+001
Carbon Dioxide	6.82e+000	9.33e+000
Methane	1.07e+000	5.32e-001
Ethane	3.96e-002	3.70e-002
Propane	1.33e-002	1.83e-002
Isobutane	6.14e-003	1.11e-002
n-Butane	9.08e-003	1.64e-002
Isopentane	2.69e-003	6.03e-003
n-Pentane	9.70e-004	2.17e-003
Other Hexanes	9.66e-003	2.59e-002
Methylcyclohexane	2.41e-002	7.35e-002
Benzene	3.12e-002	7.58e-002
C8+ Heavies	6.65e-003	3.52e-002

Total Components 100.00 6.16e+001

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: South Ignacio - D1

File Name: \\durnetapp101\Shared\Durango Shared\EHS\Air Permits\T5 - South Ignacio\SOU Permits\200101_SOU_T5_Renewal App\Dehy\SOU_D1 PTE (no combustor).ddf

Date: November 01, 2019

DESCRIPTION:

Description: 30 MMscfd dehy unit; April '19 gas analysis,
gas temp, pressure and max glycol flow (Kim
50015); max gas flow (w/o combustor)

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 67.56 deg. F
Pressure: 409.70 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	4.6651
Methane	95.0269
Ethane	0.2657
Propane	0.0249
Isobutane	0.0054
n-Butane	0.0051
Isopentane	0.0012
n-Pentane	0.0003
Other Hexanes	0.0019
Methylcyclohexane	0.0005
Benzene	0.0001
C8+ Heavies	0.0001

DRY GAS:

Flow Rate: 30.0 MMSCF/day
Absorber Stages: 1.3

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 8.3 gpm

PUMP:

Glycol Pump Type: Electric/Pneumatic

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 95.00 %
Temperature: 100.0 deg. F
Pressure: 30.0 psig

APPLICATIONS:

- Circulating pump for gas glycol dehydrators, gas amine units and other pumping applications.

FEATURES:

- No Gas Emissions
- No Packing
- Hydraulically Balanced Diaphragms
- Double-ended Shaft
- Stud Extenders for easy Head Installation
- Pulse-Free flow
- Direct or Belt Driven

SPECIFICATIONS:

- Capacity @ max. pressure:

rpm	gpm	l/min	
1500 psi (103 bar)	1200	8.3	31.4
- RPM: 1200 max. - 200 min.
- Inlet
 - 250 psi max
- Connections:
 - Inlet: 1" NPT
 - Outlet: 3/4" NPT
- Temperature:
 - Max: 250° F (121.1° C)
 - Min: 40° F (4.4° C)
 - [contact factory for temperatures below 40° F (4.4° C)]
- Fluid End Material, Manifold : SA395 / SA479
- Elastomers: Highly Saturated Nitrile
- Oil Capacity: 2.75 quarts KIMRAY Part No. 7266
2.60 Liters
- Weight (dry): 100 lbs (45.7 kg)
- Bi Directional Shaft Rotation

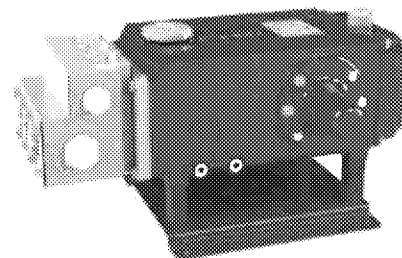
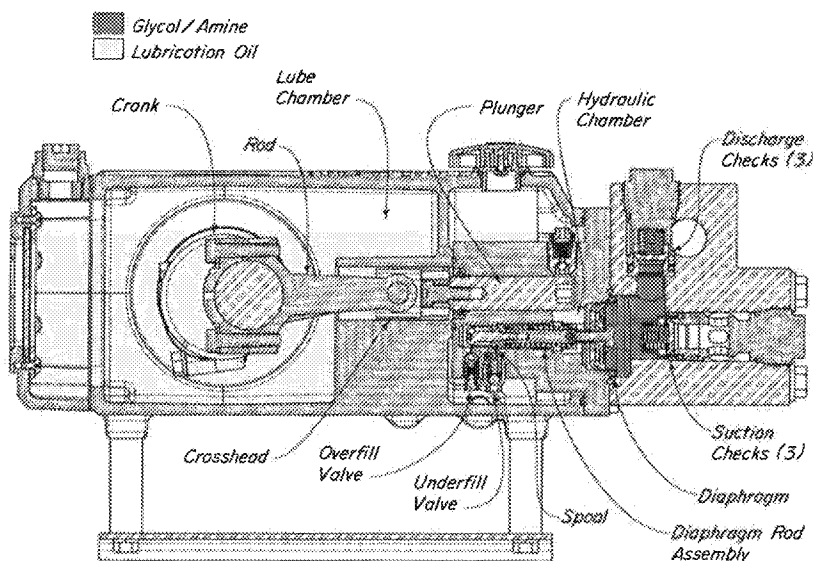
OPERATION:

The KIMRAY ELECTRIC GLYCOL PUMP is a uniquely designed hydraulically balanced diaphragm/plunger positive displacement pump. Power to the pump is provided by a properly sized and specified electric motor either directly connected or belt driven. PLUNGERS are utilized to energize DIAPHRAGMS which in turn pressurize glycol/amine solutions used in gas processing. The Plungers operate and are lubricated in clean oil isolated from the process fluids by DIAPHRAGMS. The DIAPHRAGMS are in contact with the hydraulic oil on one side and the glycol/amine solution and on the other side. KIMZOIL EGP1 is a hydraulic/lubrication oil designed for high end pump performance designed for this application. This design allows for the protection of the reciprocating pumping internals from the process fluids.

As shown in the diagram, the PLUNGER(S) are connected to the CROSSHEAD(s) and displace the oil (YELLOW) in the HYDRAULIC CHAMBER as they reciprocate. As the Plunger moves to the right on the pressure stroke, oil is displaced in the Hydraulic Chamber and forces the DIAPHRAGM(s) to move to the right. The Diaphragm movement displaces the glycol/amine solution (GREEN) on the opposing side of the Diaphragm and forces it through the DISCHARGE CHECK VALVE(s). During the pressure stroke, a small amount of oil (YELLOW) leaks past the clearance between the Plunger and cylinder.

As the Plunger moves back on the suction stroke, the pressure drops in the Hydraulic Chamber and a small amount of oil is drawn in through the UNDER-FILL VALVE to replace the oil lost during the pressure stroke. The position of the Spool Valve regulates how much oil is drawn in. The SPOOL VALVE is positioned by the DIAPHRAGM ROD ASSEMBLY which is connected to the Diaphragm. The cycle then repeats.

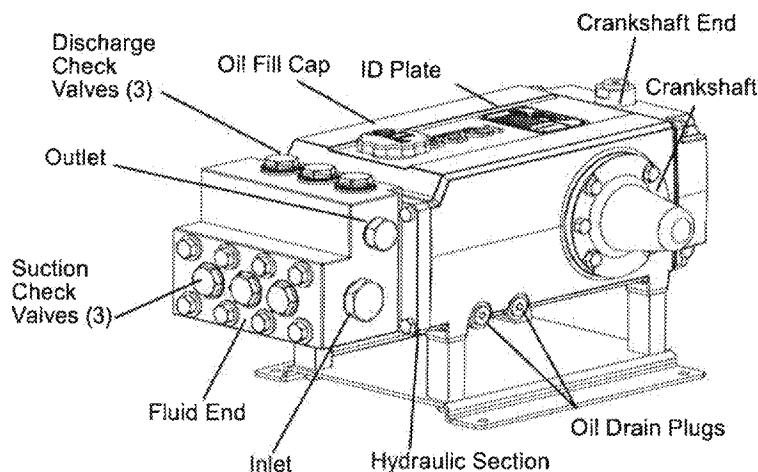
When the Diaphragm moves too far forward, the Under-Fill port closes and the Over-Fill port opens. The Under-Fill Valve is a check valve that lets oil in during the suction stroke, but will not allow oil to leave. The OVER-FILL VALVE is a check valve that lets oil out during the pressure stroke, but prevents oil from coming in. The spool valve position opens the port to one of the two valves depending on the need for more or less oil.



Kimray is an ISO 9001- certified manufacturer.

ELECTRIC PUMPS
OVERVIEW

Component Identification



LOCATION:

Locate the pump as close to the fluid supply source as possible.

Allow room for checking the oil level, changing the oil (two drain plugs on the bottom and back of pump), and removing the pump head components (inlet and discharge retainer plates, manifold, and related items).

MOUNTING

The pump shaft can rotate in either direction.

To prevent vibration, mount the pump and motor securely on a level rigid base.

On a belt-drive system, align the sheaves accurately; poor alignment wastes horsepower and shortens the belt and bearing life. Make sure the belts are properly tightened, as specified by the belt manufacturer.

On a direct-drive system, align the shafts accurately. Unless otherwise specified by the coupling manufacturer, maximum parallel misalignment should not exceed 0.015 in. (0.4 mm) and angular misalignment should be held to 1° maximum. Careful alignment extends life of the coupling, pump, shafts, and support bearings. Consult coupling manufacturer for exact alignment tolerances.

PUMPS AVAILABLE:

CAT. NO.	TYPE	OPER. PRESS. MINIMUM	OPER. PRESS. MAXIMUM
GEA	50015 EV	0	1500

REPAIR KITS AVAILABLE:

CAT. NO.	TYPE	MATERIAL
RZAHSN	CHECK VALVE REPAIR KIT	HIGHLY SATURATED NITRILE
RZBHSN	COMPLETE REPAIR KIT	HIGHLY SATURATED NITRILE
RZCHSN	DIAPHRAGM REPAIR KIT	HIGHLY SATURATED NITRILE

OIL AVAILABLE:

CAT. NO.	TYPE	CAPACITY QUARTS	CAPACITY LITERS
7266	EGP1 KIMZOIL	2.75	2.60

G:20.2
Issued 2/16

ACCESSORIES

Consult installation drawing above for typical system components. Contact KIMRAY INC. or the distributor in your area for more details.

IMPORTANT PRECAUTIONS

Adequate Fluid Supply. To avoid cavitation and premature pump failure, be sure that the pump will have an adequate fluid supply and that the inlet line will not be obstructed.

Positive Displacement. This is a positive-displacement pump. Install a relief valve downstream from the pump.

Safety Guards. Install adequate safety guards over all pulleys, belts, and couplings. Follow all codes and regulations regarding installation and operation of the pumping system.

Shut-Off Valves. Never install shut-off valves between the pump and discharge pressure regulator, relief valve, or in the regulator bypass line.

Freezing Conditions. Protect the pump from freezing. See also the Maintenance Section.

Consult the Factory for the following situations:

- Extreme temperature applications – above 250° F (82° C) or below 40° F (4.4° C)
- Viscous fluid applications above 100 Cps
- Chemical compatibility problems
- Hot ambient temperatures – above 110° F (43° C)
- Conditions where pump oil may exceed 200° F (93° C) because of a combination of hot ambient temperatures, hot fluid temperature, and full horsepower load — an oil cooler may be required
- Pump RPM less than 200

CALCULATING REQUIRED HORSEPOWER (KW)*

$$\frac{\text{gpm} \times \text{psi}}{1,480} = \text{electric motor HP}^*$$

$$\frac{\text{lpm} \times \text{bar}}{511} = \text{electric motor kW}^*$$

* HP/kW is required application power.

ATTENTION!

When sizing motors with variable speed drives (VFDs), it is very important to select a motor and a VFD rated for constant torque inverter duty service and that the motor is rated to meet the torque requirements of the pump throughout desired speed range.

Kimray is an ISO 9001- certified manufacturer.

Current Revision:
Change Kit codes

Case Name: South Ignacio - D2

File Name: \\durnetapp101\Shared\Durango Shared\EHS\Air Permits\T5 - South Ignacio\SOU Permits\200101 SOU_T5_Renewal App\Dehy\SOU_D2 PTE (no combustor).ddf

Date: November 01, 2019

DESCRIPTION:

Description: 40 MMscfd dehy unit; April '19 gas analysis,
gas temp, pressure and max glycol flow (3
Kim 20015); max gas flow, (no combustor)

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.8102	19.446	3.5489
Ethane	0.0225	0.541	0.0987
Propane	0.0094	0.225	0.0410
Isobutane	0.0056	0.135	0.0246
n-Butane	0.0086	0.206	0.0375
Isopentane	0.0033	0.079	0.0143
n-Pentane	0.0012	0.030	0.0055
Other Hexanes	0.0165	0.396	0.0722
Methylcyclohexane	0.0758	1.820	0.3322
Benzene	0.0905	2.171	0.3962
C8+ Heavies	0.0411	0.987	0.1802
Total Emissions	1.0848	26.035	4.7514
Total Hydrocarbon Emissions	1.0848	26.035	4.7514
Total VOC Emissions	0.2520	6.048	1.1038
Total HAP Emissions	0.0905	2.171	0.3962
Total BTEX Emissions	0.0905	2.171	0.3962

FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.2025	76.860	14.0269
Ethane	0.0224	0.537	0.0980
Propane	0.0041	0.098	0.0178
Isobutane	0.0015	0.036	0.0065
n-Butane	0.0017	0.040	0.0073
Isopentane	0.0005	0.013	0.0023
n-Pentane	0.0002	0.004	0.0007
Other Hexanes	0.0014	0.034	0.0062
Methylcyclohexane	0.0008	0.020	0.0037
Benzene	0.0002	0.004	0.0007
C8+ Heavies	0.0001	0.002	0.0004
Total Emissions	3.2353	77.647	14.1706
Total Hydrocarbon Emissions	3.2353	77.647	14.1706

Total VOC Emissions	0.0104	0.250	0.0457
Total HAP Emissions	0.0002	0.004	0.0007
Total BTEX Emissions	0.0002	0.004	0.0007

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	64.0499	1537.198	280.5386
Ethane	0.4476	10.742	1.9605
Propane	0.0813	1.952	0.3562
Isobutane	0.0296	0.711	0.1298
n-Butane	0.0333	0.800	0.1460
Isopentane	0.0105	0.253	0.0462
n-Pentane	0.0031	0.075	0.0136
Other Hexanes	0.0283	0.679	0.1239
Methylcyclohexane	0.0169	0.407	0.0742
Benzene	0.0034	0.081	0.0148
C8+ Heavies	0.0020	0.048	0.0088
Total Emissions	64.7061	1552.946	283.4126
Total Hydrocarbon Emissions	64.7061	1552.946	283.4126
Total VOC Emissions	0.2086	5.006	0.9135
Total HAP Emissions	0.0034	0.081	0.0148
Total BTEX Emissions	0.0034	0.081	0.0148

COMBINED REGENERATOR VENT/FLASH GAS EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.0127	96.306	17.5758
Ethane	0.0449	1.078	0.1967
Propane	0.0134	0.322	0.0589
Isobutane	0.0071	0.170	0.0311
n-Butane	0.0102	0.246	0.0448
Isopentane	0.0038	0.091	0.0167
n-Pentane	0.0014	0.034	0.0061
Other Hexanes	0.0179	0.430	0.0784
Methylcyclohexane	0.0767	1.841	0.3359
Benzene	0.0906	2.175	0.3970
C8+ Heavies	0.0412	0.990	0.1806
Total Emissions	4.3201	103.682	18.9220
Total Hydrocarbon Emissions	4.3201	103.682	18.9220
Total VOC Emissions	0.2624	6.299	1.1495
Total HAP Emissions	0.0906	2.175	0.3970
Total BTEX Emissions	0.0906	2.175	0.3970

COMBINED REGENERATOR VENT/FLASH GAS EMISSION CONTROL REPORT:

Component	Uncontrolled tons/yr	Controlled tons/yr	% Reduction
Methane	284.0875	17.5758	93.81
Ethane	2.0591	0.1967	90.45
Propane	0.3972	0.0589	85.18

Isobutane	0.1544	0.0311	79.86
n-Butane	0.1836	0.0448	75.58
Isopentane	0.0605	0.0167	72.49
n-Pentane	0.0191	0.0061	67.79
Other Hexanes	0.1962	0.0784	60.01
Methylcyclohexane	0.4064	0.3359	17.35
Benzene	0.4110	0.3970	3.42
C8+ Heavies	0.1889	0.1806	4.42
<hr/>			
Total Emissions	288.1640	18.9220	93.43
<hr/>			
Total Hydrocarbon Emissions	288.1640	18.9220	93.43
Total VOC Emissions	2.0174	1.1495	43.02
Total HAP Emissions	0.4110	0.3970	3.42
Total BTEX Emissions	0.4110	0.3970	3.42

EQUIPMENT REPORTS:

ABSORBER

Specified Absorber Stages: 1.25
 Calculated Dry Gas Dew Point: 1.74 lbs. H2O/MMSCF
 Temperature: 67.6 deg. F
 Pressure: 409.7 psig
 Dry Gas Flow Rate: 42.0000 MMSCF/day
 Glycol Losses with Dry Gas: 0.0390 lb/hr
 Wet Gas Water Content: Saturated
 Calculated Wet Gas Water Content: 42.73 lbs. H2O/MMSCF
 Calculated Lean Glycol Recirc. Ratio: 8.36 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.06%	95.94%
Carbon Dioxide	99.79%	0.21%
Methane	99.99%	0.01%
Ethane	99.95%	0.05%
Propane	99.90%	0.10%
Isobutane	99.84%	0.16%
n-Butane	99.77%	0.23%
Isopentane	99.73%	0.27%
n-Pentane	99.64%	0.36%
Other Hexanes	99.49%	0.51%
Methylcyclohexane	95.98%	4.02%
Benzene	74.04%	25.96%
C8+ Heavies	94.59%	5.41%

FLASH TANK

Flash Control: Combustion device
 Flash Control Efficiency: 95.00 %
 Flash Temperature: 100.0 deg. F
 Flash Pressure: 30.0 psig

Component	Left in Glycol	Removed in Flash Gas
-----------	-------------------	-------------------------

Water	99.93%	0.07%
Carbon Dioxide	15.76%	84.24%
Methane	1.25%	98.75%
Ethane	4.79%	95.21%
Propane	10.33%	89.67%
Isobutane	15.94%	84.06%
n-Butane	20.44%	79.56%
Isopentane	23.99%	76.01%
n-Pentane	28.94%	71.06%
Other Hexanes	37.37%	62.63%
Methylcyclohexane	82.46%	17.54%
Benzene	96.58%	3.42%
C8+ Heavies	95.90%	4.10%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	54.06%	45.94%
Carbon Dioxide	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	1.60%	98.40%
n-Pentane	1.41%	98.59%
Other Hexanes	2.31%	97.69%
Methylcyclohexane	4.76%	95.24%
Benzene	5.16%	94.84%
C8+ Heavies	12.38%	87.62%

STREAM REPORTS:

WET GAS STREAM

Temperature: 67.56 deg. F
Pressure: 424.40 psia
Flow Rate: 1.75e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.00e-002	7.49e+001
Carbon Dioxide	4.66e+000	9.47e+003
Methane	9.49e+001	7.03e+004
Ethane	2.65e-001	3.69e+002
Propane	2.49e-002	5.07e+001
Isobutane	5.40e-003	1.45e+001
n-Butane	5.10e-003	1.37e+001
Isopentane	1.20e-003	3.99e+000
n-Pentane	3.00e-004	9.99e-001

Other Hexanes	1.90e-003	7.55e+000
Methylcyclohexane	5.00e-004	2.26e+000
Benzene	9.99e-005	3.60e-001
C8+ Heavies	9.99e-005	7.86e-001

Total Components	100.00	8.03e+004

DRY GAS STREAM

Temperature: 67.56 deg. F
 Pressure: 424.40 psia
 Flow Rate: 1.75e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	3.66e-003	3.04e+000
Carbon Dioxide	4.66e+000	9.45e+003
Methane	9.50e+001	7.03e+004
Ethane	2.66e-001	3.68e+002
Propane	2.49e-002	5.06e+001
Isobutane	5.39e-003	1.45e+001
n-Butane	5.09e-003	1.36e+001
Isopentane	1.20e-003	3.98e+000
n-Pentane	2.99e-004	9.95e-001
Other Hexanes	1.89e-003	7.51e+000
Methylcyclohexane	4.80e-004	2.17e+000
Benzene	7.41e-005	2.67e-001
C8+ Heavies	9.46e-005	7.43e-001

Total Components	100.00	8.02e+004

LEAN GLYCOL STREAM

Temperature: 67.56 deg. F
 Flow Rate: 1.00e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)

TEG	9.85e+001	5.55e+003
Water	1.50e+000	8.45e+001
Carbon Dioxide	3.55e-011	2.00e-009
Methane	4.77e-018	2.69e-016
Ethane	1.44e-009	8.12e-008
Propane	3.59e-011	2.02e-009
Isobutane	1.25e-011	7.06e-010
n-Butane	1.36e-011	7.65e-010
Isopentane	9.46e-007	5.32e-005
n-Pentane	3.17e-007	1.78e-005
Other Hexanes	6.94e-006	3.91e-004
Methylcyclohexane	6.73e-005	3.79e-003
Benzene	8.75e-005	4.92e-003
C8+ Heavies	1.03e-004	5.81e-003

Total Components	100.00	5.63e+003

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 67.56 deg. F
 Pressure: 424.40 psia
 Flow Rate: 1.03e+001 gpm
 NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.57e+001	5.55e+003
Water	2.70e+000	1.56e+002
Carbon Dioxide	4.77e-001	2.76e+001
Methane	1.12e+000	6.49e+001
Ethane	8.11e-003	4.70e-001
Propane	1.56e-003	9.07e-002
Isobutane	6.08e-004	3.53e-002
n-Butane	7.23e-004	4.19e-002
Isopentane	2.39e-004	1.39e-002
n-Pentane	7.55e-005	4.37e-003
Other Hexanes	7.80e-004	4.52e-002
Methylcyclohexane	1.67e-003	9.66e-002
Benzene	1.70e-003	9.88e-002
C8+ Heavies	8.45e-004	4.90e-002
-----	-----	-----
Total Components	100.00	5.80e+003

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
 Pressure: 44.70 psia
 Flow Rate: 1.73e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)
-----	-----	-----
Water	1.31e-001	1.07e-001
Carbon Dioxide	1.16e+001	2.33e+001
Methane	8.78e+001	6.40e+001
Ethane	3.27e-001	4.48e-001
Propane	4.06e-002	8.13e-002
Isobutane	1.12e-002	2.96e-002
n-Butane	1.26e-002	3.33e-002
Isopentane	3.22e-003	1.05e-002
n-Pentane	9.48e-004	3.11e-003
Other Hexanes	7.22e-003	2.83e-002
Methylcyclohexane	3.80e-003	1.69e-002
Benzene	9.52e-004	3.38e-003
C8+ Heavies	2.59e-004	2.01e-003
-----	-----	-----
Total Components	100.00	8.81e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
 Flow Rate: 1.02e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
-----	-----	-----
TEG	9.72e+001	5.55e+003
Water	2.74e+000	1.56e+002
Carbon Dioxide	7.63e-002	4.36e+000
Methane	1.42e-002	8.10e-001

Ethane	3.95e-004	2.25e-002
Propane	1.64e-004	9.37e-003
Isobutane	9.85e-005	5.62e-003
n-Butane	1.50e-004	8.57e-003
Isopentane	5.83e-005	3.33e-003
n-Pentane	2.22e-005	1.27e-003
Other Hexanes	2.96e-004	1.69e-002
Methylcyclohexane	1.40e-003	7.96e-002
Benzene	1.67e-003	9.54e-002
C8+ Heavies	8.23e-004	4.69e-002

Total Components	100.00	5.71e+003

FLASH GAS EMISSIONS

Flow Rate: 4.64e+003 scfh
Control Method: Combustion Device
Control Efficiency: 95.00

Component	Conc. (vol%)	Loading (lb/hr)

Water	6.26e+001	1.38e+002
Carbon Dioxide	3.57e+001	1.92e+002
Methane	1.63e+000	3.20e+000
Ethane	6.09e-003	2.24e-002
Propane	7.55e-004	4.07e-003
Isobutane	2.09e-004	1.48e-003
n-Butane	2.35e-004	1.67e-003
Isopentane	5.98e-005	5.27e-004
n-Pentane	1.76e-005	1.55e-004
Other Hexanes	1.34e-004	1.41e-003
Methylcyclohexane	7.06e-005	8.47e-004
Benzene	1.77e-005	1.69e-004
C8+ Heavies	4.82e-006	1.00e-004

Total Components	100.00	3.33e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 1.57e+003 scfh

Component	Conc. (vol%)	Loading (lb/hr)

Water	9.63e+001	7.18e+001
Carbon Dioxide	2.39e+000	4.36e+000
Methane	1.22e+000	8.10e-001
Ethane	1.81e-002	2.25e-002
Propane	5.13e-003	9.37e-003
Isobutane	2.34e-003	5.62e-003
n-Butane	3.56e-003	8.57e-003
Isopentane	1.10e-003	3.28e-003
n-Pentane	4.18e-004	1.25e-003
Other Hexanes	4.62e-003	1.65e-002
Methylcyclohexane	1.87e-002	7.58e-002
Benzene	2.80e-002	9.05e-002
C8+ Heavies	5.83e-003	4.11e-002

Total Components 100.00 7.72e+001

GRI-GLYCalc VERSION 4.0 - SUMMARY OF INPUT VALUES

Case Name: South Ignacio - D2

File Name: \\durnetapp101\Shared\Durango Shared\EHS\Air Permits\T5 - South Ignacio\SOU Permits\200101 SOU_T5_Renewal App\Dehy\SOU_D2 PTE (no combustor).ddf

Date: November 01, 2019

DESCRIPTION:

Description: 40 MMscfd dehy unit; April '19 gas analysis,
gas temp, pressure and max glycol flow (3
Kim 20015); max gas flow, (no combustor)

Annual Hours of Operation: 8760.0 hours/yr

WET GAS:

Temperature: 67.56 deg. F
Pressure: 409.70 psig
Wet Gas Water Content: Saturated

Component	Conc. (vol %)
Carbon Dioxide	4.6651
Methane	95.0269
Ethane	0.2657
Propane	0.0249
Isobutane	0.0054
n-Butane	0.0051
Isopentane	0.0012
n-Pentane	0.0003
Other Hexanes	0.0019
Methylcyclohexane	0.0005
Benzene	0.0001
C8+ Heavies	0.0001

DRY GAS:

Flow Rate: 42.0 MMSCF/day
Absorber Stages: 1.3

LEAN GLYCOL:

Glycol Type: TEG
Water Content: 1.5 wt% H2O
Flow Rate: 10.0 gpm

PUMP:

Glycol Pump Type: Gas Injection
Gas Injection Pump Volume Ratio: 0.080 acfm gas/gpm glycol

FLASH TANK:

Flash Control: Combustion device
Flash Control Efficiency: 95.00 %
Temperature: 100.0 deg. F
Pressure: 30.0 psig

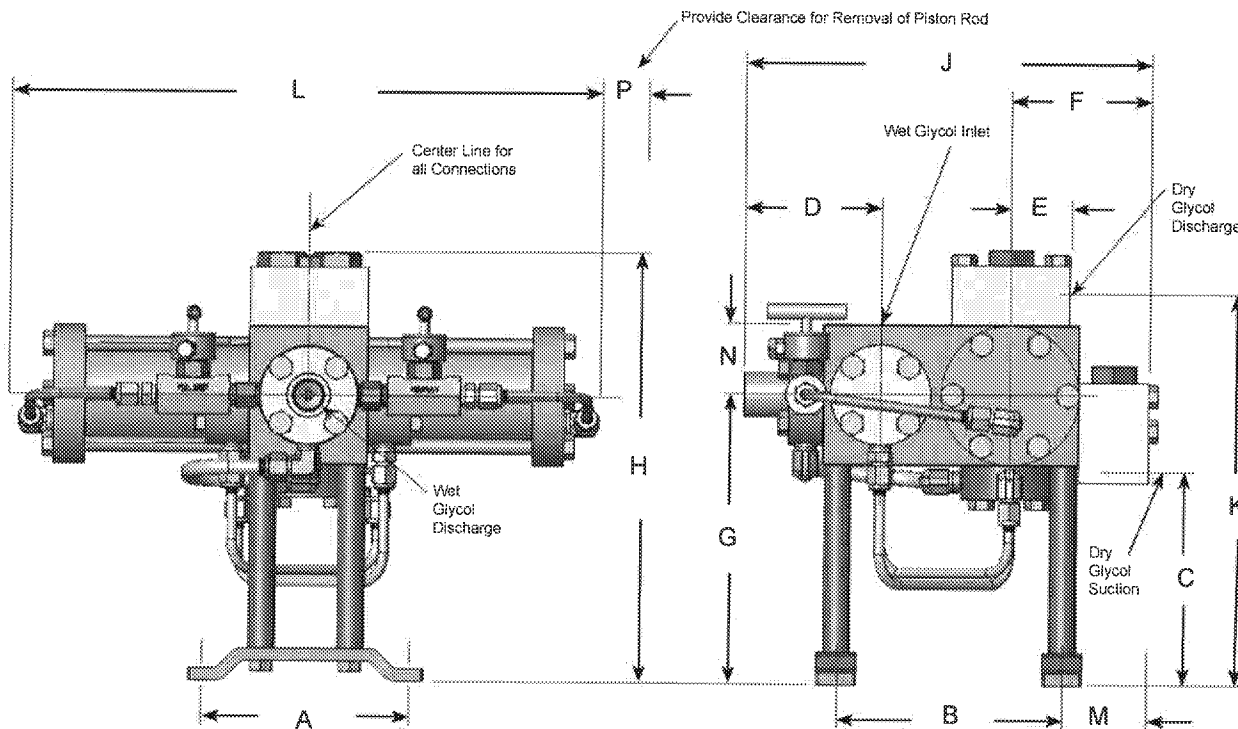


Figure 7

Table 3 - Glycol Pump Dimensions

Model PV, SC	A	B	C	D	E	F	G	H	J	K	L	M	N	P
1720 PV	5 1/4 in. (133 mm)	5 11/16 in. (144 mm)	5 3/4 in. (146 mm)	5 7/16 in. (87 mm)	1 1/2 in. (38 mm)	3 1/2 in. (89 mm)	7 1/4 in. (184 mm)	10 7/8 in. (276 mm)	10 3/16 in. (258 mm)	9 5/8 in. (244 mm)	15 in. (381 mm)	2 1/8 in. (53 mm)	1 3/4 in. (44 mm)	3 in. (76 mm)
4020 PV & 2015 SC	5 1/4 in. (133 mm)	5 11/16 in. (144 mm)	5 3/4 in. (146 mm)	5 7/16 in. (87 mm)	1 1/2 in. (38 mm)	3 1/2 in. (89 mm)	7 1/4 in. (184 mm)	10 7/8 in. (276 mm)	10 3/16 in. (258 mm)	9 5/8 in. (244 mm)	15 in. (381 mm)	2 1/8 in. (53 mm)	1 3/4 in. (44 mm)	3 in. (76 mm)
9020 PV & 5015 SC	6 1/4 in. (159 mm)	5 11/16 in. (144 mm)	6 3/8 in. (161 mm)	5 in. (127 mm)	1 3/4 in. (44 mm)	4 1/4 in. (107 mm)	8 3/4 in. (222 mm)	13 1/4 in. (336 mm)	13 7/8 in. (352 mm)	11 3/4 in. (289 mm)	20 in. (508 mm)	2 1/2 in. (63 mm)	2 in. (50 mm)	3 in. (76 mm)
21020 PV & 10015 SC	7 5/8 in. (193 mm)	10 1/8 in. ± 1/8 (257 mm)	7 in. (177 mm)	5 3/8 in. (138 mm)	2 1/4 in. (57 mm)	5 3/4 in. (146 mm)	9 1/4 in. (234 mm)	14 3/4 in. (374 mm)	16 5/8 in. (422 mm)	13 in. (330 mm)	24 in. (508 mm)	3 3/16 in. (80 mm)	2 1/2 in. (63 mm)	4 in. (101 mm)
45020 PV & 20015 SC	10 3/4 in. (273 mm)	14 ± 1/8 (355 mm)	9 in. (228 mm)	6 5/8 in. (168 mm)	2 5/8 in. (66 mm)	6 1/2 in. (155 mm)	11 3/8 in. (288 mm)	19 in. (482 mm)	21 1/8 in. (536 mm)	16 3/8 in. (415 mm)	34 in. (863 mm)	3 3/4 in. (95 mm)	3 1/2 in. (88 mm)	6 in. (152 mm)

Table 4 - Glycol Pump Specifications

Model Number	Max. Cap		Size of Pipe Connections	Mounting Bolts	Approx. Weight	Max. Strokes Per Minute	Glycol Output Strokes / Gal.	Glycol Output Gal. / Strokes
	G.P.M.	G.P.H.						
1720 PV	.67	40	1/2 in NPT (12 mm)	3/8 in. dia (9.42 mm)	66 lbs (29.93 kg)	40	59	0.017
4020 PV	.67	40	1/2 in NPT (12 mm)	3/8 in. dia (9.42 mm)	66 lbs (29.93 kg)	40	59	0.017
9020 PV	1.5	90	3/4 in NPT (19 mm)	1/2 in. dia (12 mm)	119 lbs (53.97 kg)	40	26.3	0.038
21020 PV	3.5	210	1 in NPT (25 mm)	1/2 in. dia (12 mm)	215 lbs (97.52 kg)	32	9	0.111
45020 PV	7.5	450	1 1/2 in NPT (38 mm)	1/2 in. dia (12 mm)	500 lbs (226.8 kg)	26	3.5	0.283
2015 SC	.33	20	1/2 in NPT (12 mm)	3/8 in. dia (9.52 mm)	66 lbs (29.93 kg)	55	147	0.0068
5015 SC	.63	50	3/4 in NPT (19 mm)	1/2 in. dia (12 mm)	119 lbs (53.97 kg)	50	52	0.019
10015 SC	1.67	100	1 in NPT (25 mm)	1/2 in. dia (12 mm)	215 lbs (97.52 kg)	48	25	0.040
20015 SC	3.33	200	1 1/2 in NPT (38 mm)	1/2 in. dia (12 mm)	500 lbs (226.8 kg)	40	6.8	0.114

Heater & Reboiler Emission Calculations

South Ignacio Central Delivery Point

Red Cedar Gathering Company

Type	TEG Reboiler	TEG Reboiler	Tank Heater	Catalytic Heater
Unit ID	RB1	RB2	H-101 & H-102	H-103
Unit Rating:	1.750 mmBtu/hr	0.750 mmBtu/hr	0.325 mmBtu/hr	0.008 mmBtu/hr
Fuel usage ^a :	1.944 mscf/hr 17.03 mmscf/yr	0.833 mscf/hr 7.30 mmscf/yr	0.361 mscf/hr 3.16 mmscf/yr	0.009 mscf/hr 0.08 mmscf/yr
Operating hours:	8760 hr/yr	8760 hr/yr	8760 hr/yr	8760 hr/yr

^a Based on fuel heat content of: 900 Btu/scf (conservative estimate based on fuel gas analysis)

Criteria Pollutant Emissions			Potential Emissions (tpy)	Potential Emissions (tpy)	Potential Emissions (tpy)	Potential Emissions (tpy)
Pollutant	Emission Factor	Data Source	RB1	RB2	H-101 & H-102	H-103
NO _x	100.0 lb/MMscf	AP-42; Table 1.4-1	0.85	0.37	0.16	0.00
CO	84.0 lb/MMscf	AP-42; Table 1.4-1	0.72	0.31	0.13	0.00
PM ₁₀	7.6 lb/MMscf	AP-42; Table 1.4-2	0.06	0.03	0.01	0.00
SO ₂	0.6 lb/MMscf	AP-42; Table 1.4-2	0.01	0.00	0.00	0.00
VOC	5.5 lb/MMscf	AP-42; Table 1.4-2	0.05	0.02	0.01	0.00
CO ₂	120000.0 lb/MMscf	AP-42; Table 1.4-2	1022.00	438.00	189.80	4.67
Methane	2.3 lb/MMscf	AP-42; Table 1.4-2	0.02	0.01	0.00	0.00
CO ₂ e	—	—	927.59 MT/yr	397.54 MT/yr	172.27 MT/yr	4.24 MT/yr

Hazardous Air Pollutant (HAP) Emissions			Potential Emissions (tpy)	Potential Emissions (tpy)	Potential Emissions (tpy)	Potential Emissions (tpy)
Pollutant	Emission Factor ^b	Data Source	RB1	RB2	H-101 & H-102	H-103
1,3-Butadiene	3.42E-04 lb/MMBtu	GRI Field Test Data	2.62E-03	1.12E-03	4.87E-04	1.20E-05
2,2,4-Trimethylpentane	2.84E-03 lb/MMBtu	GRI Field Test Data	2.18E-02	9.33E-03	4.04E-03	9.95E-05
Acetaldehyde	7.38E-04 lb/MMBtu	GRI Field Test Data	5.66E-03	2.42E-03	1.05E-03	2.59E-05
Benzene	7.48E-04 lb/MMBtu	GRI Field Test Data	5.73E-03	2.46E-03	1.06E-03	2.62E-05
Ethylbenzene	2.11E-03 lb/MMBtu	GRI Field Test Data	1.62E-02	6.93E-03	3.00E-03	7.39E-05
Formaldehyde	8.44E-04 lb/MMBtu	GRI Field Test Data	6.47E-03	2.77E-03	1.20E-03	2.96E-05
Methanol	9.64E-04 lb/MMBtu	GRI Field Test Data	7.39E-03	3.17E-03	1.37E-03	3.38E-05
n-Hexane	1.8 lb/MMscf	AP-42; Table 1.4-3	1.53E-02	6.57E-03	2.85E-03	7.01E-05
Styrene	2.08E-03 lb/MMBtu	GRI Field Test Data	1.59E-02	6.83E-03	2.96E-03	7.29E-05
Toluene	1.02E-03 lb/MMBtu	GRI Field Test Data	7.82E-03	3.35E-03	1.45E-03	3.57E-05
Xylene	1.32E-03 lb/MMBtu	GRI Field Test Data	1.01E-02	4.34E-03	1.88E-03	4.63E-05
TOTAL HAPS	—	—	1.15E-01	4.93E-02	2.14E-02	5.26E-04

^b Uncontrolled emission factors for external natural gas combustion sources based on the highest emission factor between EPA's AP-42, GRI field data and GRI literature data sets, and the manufacturer's data.

Fugitive Emission Calculations

Equipment count based fugitive emission approach using EPA's 1995 guidance for Oil and Gas Production Operations Table 2-4 emission factors

Facility:

South Ignacio Central Delivery Point

Engines/Compressors

of Engines: 8

of cylinders per compressor: 12

Components	Emission factor ^a (kg/hr/source)	Count	Total Emissions (lb/hr)
Valves (gas)	0.0045	248	2.460
Valves (light oil/liquid)	0.0025	160	0.882
Pump seals (light oil)	0.013	64	1.834
Other ^b	0.0088	272	5.277
Pressure relief valves	--	--	--
Connectors (gas)	0.00025	1408	0.776
Open-ended lines ^c	0.0023	24	0.122
Pneumatic Device Vents	--	--	--
Total Emissions			11.351

Dehydrators

of Dehys: 2

total # of glycol pumps: 5

Components	Emission factor ^a (kg/hr/source)	Count	Total Emissions (lb/hr)
Valves (gas)	0.0045	56	0.556
Valves (light oil/liquid)	0.0025	74	0.408
Pump seals (gas)	0.0024	10	0.053
Pump seals (light oil)	0.013	10	0.287
Other ^b	0.0088	30	0.582
Pressure relief valves	--	--	--
Connectors (gas)	0.00025	352	0.194
Open-ended lines ^c	0.0023	4	0.020
Pneumatic Device Vents	--	--	--
Total Emissions			2.099

Station

of Inlet Separators: 1

of engine/lube oil tanks: 8

Components	Emission factor ^a (kg/hr/source)	Count	Total Emissions (lb/hr)
Valves (gas)	0.0045	79	7.837
Valves (light oil/liquid)	0.0025	100	5.512
Pump seals (gas)	0.0024	16	0.847
Pump seals (light oil)	0.013	16	4.586
Other ^b	0.0088	26	5.044
Pressure relief valves	--	--	--
Connectors (gas)	0.00025	251	1.383
Open-ended lines ^c	0.0023	9	0.456
Pneumatic Device Vents	--	--	--
Total Emissions			25.665

Total Facility Fugitive Emissions

Total vented Gas:

217.88 ton/yr

Average Gas Composition ^f	Mol %	Ton/Yr
Carbon Dioxide	4.6651	10.164
Nitrogen	0.0000	0.000
Methane	95.0269	207.045
Ethane	0.2657	0.579
Propane	0.0249	0.054
Isobutane	0.0054	0.012
n-Butane	0.0051	0.011
Isopentane	0.0012	0.003
n-Pentane	0.0003	0.001
Cyclopentane	0.0000	0.000
n-Hexane	0.0000	0.000
Cyclohexane	0.0000	0.000
Other Hexanes	0.0019	0.004
Heptanes	0.0000	0.000
2,2,4-trimethylpentane	0.0005	0.001
Methycyclohexane	0.0000	0.000
Benzene	0.0001	0.000
Toluene	0.0000	0.000
Ethylbenzene	0.0000	0.000
Xylenes	0.0000	0.000
C8 + Heavies	0.0001	0.000
Total VOC^g	0.040	0.09
Total HAP^h	0.000	0.00
Total CO₂	4.665	10.16
Total Methane	95.027	207.05
Total CO₂e	--	5,186.29

Compressor Blowdowns

of Compressors

8

Number of blowdowns^d	96	blowdowns/yr
Gas vented per blowdown^e	20.0	Mscf/blowdown
Molecular weight of gas^f	17.401	g/mol
Gas vented annually	1,920.00	Mscf/yr
Density of Vented Gas^h	0.05	lb/scf
Total Emissions	46.55	ton/yr

^a Emission factors from EPA's 1995 Protocol for Equipment Leak Emission Estimates, Table 2-4

^b Derived from compressors, diaphragms, drains, dump arms, hatches, instruments, meters, pressure relief valves, relief valves and vents; applied to all equipment types other than valves, pump seals, connectors, or flanges.

^c Default component count from Table W-1B of Subpart W of 40 CFR Part 98

^d Conservatively based on 12 blowdowns a year for each compressor

^e Conservative estimate using equation W-14a (40 CFR §98.233) and a 4,735 hp Caterpillar G3616LE plus an additional 2% for compressor starts

^f Conservatively based on the April 2019 inlet gas analyses (this sample has the highest HAP and VOC content measured within the last year).

^h Density of Gas (lb/scf) = 16.859 g/mol * mol/22.4L * lb/453.592g * 28.316L/scf = 0.05 lb/scf

ⁱ Non-methane, non-ethane compounds

^j HAP emissions include benzene, toluene, ethylbenzene, xylenes, and n-hexane

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification: 500 bbl used oil tank
City: Durango
State: Colorado
Company: Red Cedar
Type of Tank: Vertical Fixed Roof Tank
Description:

Tank Dimensions

Shell Height (ft): 20.00
Diameter (ft): 13.25
Liquid Height (ft): 19.00
Avg. Liquid Height (ft): 10.00
Volume (gallons): 19,597.85
Turnovers: 12.00
Net Throughput(gal/yr): 235,174.20
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good
Roof Color/Shade: Gray/Medium
Roof Condition: Good

Roof Characteristics

Type: Cone
Height (ft): 1.00
Slope (ft/ft) (Cone Roof): 0.00

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

500 bbl used oil tank - Vertical Fixed Roof Tank
Durango, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	51.70	37.44	66.07	44.10	0.0040	0.0031	0.0080	130.0000			188.00	Option 1: VP60 = .0045 VP60 = .0005

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

500 bbl used oil tank - Vertical Fixed Roof Tank
Durango, Colorado

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	3.53	6.38	9.91

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification: 95 bbl still vent tank
City: Durango
State: Colorado
Company: Red Cedar
Type of Tank: Vertical Fixed Roof Tank
Description:

Tank Dimensions

Shell Height (ft): 3.00
Diameter (ft): 15.00
Liquid Height (ft): 3.00
Avg. Liquid Height (ft): 2.00
Volume (gallons): 3,965.76
Turnovers: 2.00
Net Throughput(gal/yr): 7,931.53
Is Tank Heated (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good
Roof Color/Shade: Gray/Medium
Roof Condition: Good

Roof Characteristics

Type: Cone
Height (ft): 0.00
Slope (ft/ft) (Cone Roof): 0.00

Breather Vent Settings

Vacuum Settings (psig): 0.00
Pressure Settings (psig): 0.00

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

95 bbl still vent tank - Vertical Fixed Roof Tank
Durango, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg	Min.	Max.		Avg	Min.	Max.					
Distillate fuel oil no. 2	All	51.76	37.44	66.07	44.16	0.0049	0.0031	0.0080	130.0000			188.00	Option 1: VP80 = .0045 VP60 = .0065

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

95 bbl still vent tank - Vertical Fixed Roof Tank
Durango, Colorado

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.12	0.83	0.95

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification: 500 gal oil tank
City: Durango
State: Colorado
Company: Red Cedar
Type of Tank: Horizontal Tank
Description:

Tank Dimensions

Shell Length (ft): 5.00
Diameter (ft): 4.00
Volume (gallons): 500.00
Turnovers: 24.00
Net Throughput(gal/yr): 12,000.00
Is Tank Heated (y/n): N
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

500 gal oil tank - Horizontal Tank
Durango, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	All	51.75	37.44	66.07	44.10	0.0046	0.0031	0.0080	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0095

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

500 gal oil tank - Horizontal Tank
Durango, Colorado

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	0.18	0.18	0.36

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification: 500 gal TEG tank
City: Durango
State: Colorado
Company: Red Cedar
Type of Tank: Horizontal Tank
Description:

Tank Dimensions

Shell Length (ft): 5.00
Diameter (ft): 4.00
Volume (gallons): 500.00
Turnovers: 2.00
Net Throughput(gal/yr): 1,000.00
Is Tank Heated (y/n): N
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

500 gal TEG tank - Horizontal Tank
Durango, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Triethylene Glycol	All	51.73	37.44	68.07	44.16	0.0000	0.0000	0.0000	150.1700			150.17	Option 2: A=7.19302007, B=2158.4581, C=185.92442

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

500 gal TEG tank - Horizontal Tank
Durango, Colorado

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Triethylene Glycol	0.00	0.00	0.00

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification: 500 gal TEG tank
City: Durango
State: Colorado
Company: Red Cedar
Type of Tank: Horizontal Tank
Description:

Tank Dimensions

Shell Length (ft): 5.00
Diameter (ft): 4.00
Volume (gallons): 500.00
Turnovers: 2.00
Net Throughput(gal/yr): 1,000.00
Is Tank Heated (y/n): N
Is Tank Underground (y/n): N

Paint Characteristics

Shell Color/Shade: Gray/Medium
Shell Condition: Good

Breather Vent Settings

Vacuum Settings (psig): -0.03
Pressure Settings (psig): 0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

500 gal TEG tank - Horizontal Tank
Durango, Colorado

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Ethylene Glycol	All	51.76	37.44	66.07	44.16	0.0004	0.0002	0.0010	62.0700			62.07	Option 2: A=8.21211, B=2161.81, C=208.43

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

500 gal TEG tank - Horizontal Tank
Durango, Colorado

Components	Losses(lbs)		
	Working Loss	Breathing Loss	Total Emissions
Ethylene Glycol	0.00	0.01	0.01